WISCONSIN ACADEMY

OF

SCIENCES, ARTS, AND LETTERS

ELEVENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1880.

"Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης."
Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1881.

Contents.

PREFACE.

A considerable reduction has been made this year in the size of our Report. This has been effected mainly by omitting the lists the Flora, &c., of the neighbourhood which have been previously published every year. These lists are, it is believed, now nearly complete, and it has been thought unnecessary to incur the expense of an annual reprint. Those who wish to obtain copies will find them in the Report for 1879, when this is sold off it is proposed to issue them in a separate form. Any additions or corrections to be made will be noticed from time to time in our Annual Reports.

Early in the year an Oxy-Hydrogen Lantern and Microscope were presented to the Society by the Honorary Members, to whom our best thanks are due. These have enabled us to render our Saturday evening Lectures much more interesting, and a large increase in the attendance has resulted.

It is with deep regret that we record the death of Mr. H. D. Pender (O.W.) who took such a warm interest in our welfare. It is hoped that some means may be found for carrying on the Prize so recently established by him.

Our thanks are due to Mr. P. H. Carpenter for a very interesting Lecture on "Deep Sea Dredging" of which we give a short abstract; our readers will be glad to know that Mr. Carpenter has promised to repeat his visit to Wellington.

RULES.

1. That this Society be called the "Wellington College Natural Science Society."

2. That the Society consist of Honorary Members, Corresponding Members, Members, and Associates: the number of Members being limited to Fifteen.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary, and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of Two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of Management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the Term.

18. That at every P. B. M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers, with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting,and that no visitors, except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description, further, that all Exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers be told off to collect the Exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the Sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That Memberships, not exceeding five in number, be extended to those who possess special qualifications.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

OFFICERS.

PRESIDENT—S. A. SAUNDER, ESQ.
VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD
SECRETARY—F. A. KIRKPATRICK, D. N. POLLOCK.
TREASURER—R. R. OTTLEY, P. G. GATES.

ALBUM KEEPERS.

ENTOMOLOGICAL—T. GREENWOOD, P. L. BAYLY.
BOTANICAL—C. R. ASHBEE.
METEOROLOGICAL—F. C. EDEN, H. T. BROOKING.
ZOOLOGICAL—T. C. ROSS.
GEOLOGICAL—R. A. GODWIN-AUSTEN.
ETHNOLOGICAL—T. L. MACKESY, T. C. PAKENHAM

CORRESPONDING MEMBERS.

THE LORD BISHOP OF TRURO.

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PROF. RUPERT JONES.
B. E. HAMMOND, ESQ.
CAPT. COOPER-KING, F.G.S.
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H. W. EVE, ESQ.
REV. T. H. FREER.
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M. J. SLATER, ESQ.
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REV. H. G. WATKINS.
VERY REV. E. SPOONER.
J. B. ATLAY.
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ASSOCIATES.

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A. R. WIRGMAN.†
B. C. R. YOUNG.†
F. W. ABBOTT.†
E. A. MITCHELL-INNES.
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J. P. DUCANE.
F. H. DRUCE.
R. A. H. PEEL.†
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B. L. SCLATER.
W.H.WILLIAMSON.
B. T. BULL.
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A. G. NORRIS.
J. A. C. SKINNER.
D. H. BARKER.
C.P.G. GRIFFIN.
G. WALTER.
A. H. M. PEARETH.
A. S. WELLS.
G. CALDECOTT.
G. D. WHITE.
W. SILLEM.
J. C. COX.
H. H. PEACOCK.
J. H. P. GRAHAM.
A. D. W. POLLOCK.
H. G. LYONS.

* Left Lent, 1880. † Left Midsummer, 1880. ‡ Left Christmas, 1880.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College		...	N.H.S.
Cheltenham ,,		...	N.H.S.
*Marlborough ,,		...	N.H.S.
Clifton		...	N.H.S.
*Rugby School	...	...	N.H.S.
*Dulwich College	...	...	N.H.S.
*East Kent ,,	...	...	N.H.S.
*Haileybury ,,	...	...	N.H.S.
*Birmingham School		...	N.H.S.

*U. S. Geological Survey

Linnæan Society.

Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

*Those marked with an asterisk exchange Reports with us.

N.S.S. ACCOUNTS.

Receipts.

	£	s.	d.
Subscriptions—Lent Term, 1880... ...	2	8	6
„ Easter Term „	4	18	0
„ Michaelmas Term, 1880 ...	8	5	0
Grant from the Master	5	0	0
Donations	0	18	0
	£15	14	6

Audited and found correct, S. A. SAUNDER,
Dec. 18, 1880.

Expenditure.

	£	s.	d.
Deficit	1	4	2
D.W. Charts	1	5	0
Negretti and Zambra	1	18	6
Ladd.	0	15	0
Repairs to Anemometer	0	15	6
Books—Larvæ of Lepidoptera	2	18	0
Locks and keys	0	8	9
2nd Entomological Prize	0	10	0
Bishop for Report	5	0	8
Commissionaire for keeping Charts ...	0	7	6
Stationery and Postage	0	8	11
Porterage	0	1	4
Balance in hand	0	16	2
	£15	14	6

P. GATES, *Treasurer*.

MINUTES OF OPEN MEETINGS.

Saturday, February 9th.

The President read a paper on "Shooting Stars and Comets."

The regions of space round the Sun are crowded with small masses of stone and metal called meteoroids. When these bodies enter the earth's atmosphere, their motion being arrested, they are intensely heated and become visible as meteors or shooting stars.

Sometimes a meteoroid is large enough to reach the Earth before it is completely burnt out or dissipated in vapour, the fragments are then called meteorites.

(Some specimens of different kinds of meteorites were exhibited.)

There are some few astronomers who believe that the stone producing meteors belong to a different class of bodies from the ordinary shooting star.

There is a very remarkable stream of meteoroids encountered by the Earth in November three times in a century. It has been shewn that these are moving round the Sun in an elongated orbit extending beyond that of the planet Uranus, and it has been suggested by Le Verrier that they may have been permanently attached to the Solar system by the attraction of this planet.

One of the most remarkable of modern astronomical discoveries has been that of a connection between comets and meteoroids, it having been found that several streams of meteoroids are moving in identical orbits with known comets. Astronomers are not yet agreed as to the exact nature of this connection.

(Drawings of several remarkable comets were exhibited on the screen and their chief characteristics pointed out.)

Several theories have been advanced as to the constitution of comets. Some have thought that they are entirely gaseous, others that they must have a solid nucleus, and others again that they are merely dense clouds of meteoroids. Many arguments may be advanced in favour of this last hypothesis.

Should the Earth ever come into collision with the nucleus of a large comet the consequences would be disastrous whichever of these hypotheses is correct, but the chance of such an event is extremely small.

It is probable that the irresolvable nebulæ are large clouds of these stones in violent motion, and that the Zodiacal light is caused by a belt of the same bodies surrounding the Sun and reflecting its light, whilst Professor Clerk Maxwell has shewn that, if the rings of Saturn consisted of matter in any other form with which we are acquainted, they must long ago have broken up or fallen on to the planet.

At the conclusion of the lecture the Rev. A. Carr presented to the Society in the name of the Honorary Members an oxy-hydrogen lantern and Microscope. The lantern had been previously used to illustrate the lecture.

A vote of thanks to the donors proposed by the President was carried unanimously.

Saturday, March 6th.

R. R. Ottley read a paper on "North American Indians."

The Lecturer treated first of the divisions into which the Indian tribes fall, according to habit, language, and general appearance. The chief divisions were the Algonquins in the East, described by Cooper, the Chippeways, Delawares, etc. Next, the Plain Indians, who live by chasing the buffalo and wild horses (the methods employed in these hunts were described), and the Cherokee division in the South East, cruelly treated by the United States forces under Gen. Jackson, and transplanted to the West of the Mississippi. The Northern tribes and those in the extreme West, are less refined and lower in the scale of humanity than the Southern and Eastern tribes. The lecture was illustrated by slide-illustrations of scenes famous in Indian history, also of Indian parties engaged in buffalo-hunting and war.

Saturday, May 15th.

C. R. Ashbee read his Essay on "The Microscope," to which was awarded the Eve Essay Prize for 1879.

The early history of the Microscope, like that of many other scientific instruments, is involved in some obscurity. Aristophanes speaks of a burning glass sphere; Seneca says that small and indistinct objects become larger and more distinct in form

when seen through a globe filled with water; Pliny speaks of glass lenses burning; Ptolemy undoubtedly knew of the magnifying property of lenses i.e. of the simple Microscope; for the compound Microscope, which is a combination of two or more lenses, was not invented until the end of the 16th Century.

The simplest form of compound Microscope consists of two lenses, the Object Glass and the Eye Glass. A third added between the two is called the Field Glass. This, together with the Eye Glass, forms the Eye Piece. The Cylinder containing these lenses is fixed into an aperture in a moveable stage and apparatus is supplied for focal adjustment, since the lenses are of different powers.

Transparent objects under the Microscope have light cast on them by a mirror below the stage: opaque objects by the condensing lens from above. By means of the Life Box living animals may be seen under the Microscope.

Some simple objects to be seen under the Microscope were shown by means of the lantern and screen, e.g. the head of a bee, which consists principally of eyes, which are made up of some thousands of *ocelli*. A fly has 4,000 such ocelli, a dragonfly 24,000. In the spider we may see the well-developed *lingula* or tongue, the leg divided into five parts (common to most insects) and strong claws covered with saw-like teeth. A fly's foot is composed of two membranous expansions, covered with hair, through which, by emitting a glutinous fluid the fly can stand on smooth surfaces upside down. An interesting object is the one-eyed Cyclops Quadricornus, a little water-insect hardly visible to the naked eye, which makes a little whirlpool with its feet and so conveys food to its mouth, its own children often being washed in by the eddy and so falling victims to the appetite of their mother: but this is hardly to be wondered at, since in one year Cyclops Quadricornus has produced 4,442,189, 120 young. Other insects shown were the Tropical Cockchafer, a nuisance almost equally objectionable whether alive or dead, and the cricket, which is not afraid to attack, vanquish, and eat black beetles.

Saturday, June 5th.

P. H. Carpenter, Esq., read a paper on "Deep Sea Dredging."

The lecturer began by discussing the depth of the great ocean basins, not including parts near land: the average depth being about 2,500 fathoms. The greatest depth yet found is some-

thing over five miles, off the coast of Japan. Until a comparatively late period it was supposed that animals did not exist at a greater depth than 300 fathoms, since they were not found below that depth in the Mediterranean, where the deposit of numerous rivers smothers all that might live at the bottom. But in the year 1819, Capt. (afterwards Sir Thomas) Picton, found entangled in a sounding line, which had just been drawn up from a great depth, a star fish. The existence of animals at the bottom of the sea was conclusively proved when a damaged telegraph cable from Sardinia to Africa being taken up was found covered with a kind of Corals, which, when once fixed, never move from their position. From that time various expeditions have been sent out, principally by the British government, to study this branch of Zoology: the discoveries thus made led to the great expedition of the Challenger, in 1877. Some important links were thus found between living species and some only known in a fossil state, e.g. in the case of *Holtenia Carpenteri*, a Silicious Sponge resembling the fossil *ventriculities* of the chalk. It belongs to the group of *Hexactinellidæ* which are the most numerous and characteristic of the deep-lying fauna. Very similar forms are found in abundance down to depths of 1000 fathoms along the coasts of Portugal and Brazil, while some species are apparentlv cosmopolitan. On first seeing this specimen, Professor Huxley said to his wife, "Don't speak to me: this passeth the love of women." North West of Norway was found a sea-lily, a degenerate relative of the Bradford clay *apiocrinites rotundus*, which lived in tropical seas. The intermediate stage being found in the chalk: the lowest type is that found in the Arctic Seas, so that animals degenerate as the water in which they live becomes colder. By means of slides we were shown members of newly-discovered species, chiefly protozoa and diagrams of Globigerinæ and Diatoms were explained.

Saturday, July 24th.

F. A. Kirkpatrick read a paper on "The Connaught Rangers."

The Regiment was raised in Galway, in 1793, by General de Burgh and his relations, for the French War, and went through the disastrous Dutch campaign of 1794—5, when the English army lost fearfully by cold, privation, and typhus fever. They were next employed in suppressing a French and Negro insurrection in Grenada, but the yellow fever caused frightful mortality both there and on the homeward voyage. The 88th was part of the "Indian Army," which left Bombay in Dec.,

1800, for the invasion of Egypt, and arrived at Cairo in August, 1801, when the garrison of Alexandria, which soon after capitulated, was the sole remnant of Napoleon's invading force. In the Peninsula war the 88th got the name of "The Devil's Own Connaught Boys," from gallantry in action and irregularity in quarters. They also went through the whole of the Crimea and served in the Indian Mutiny.

Saturday, October 16th.

G. Sillem read a paper in the Lecture Theatre on "North Wales," illustrating it by slides in the oxy-hydrogen lantern. He began by sketching the history and manners of the ancient inhabitants generally; the names of Wales and Welsh are derived from the Saxon *weales*; Cymri being the name by which the Welsh called themselves, whence the Roman name Cambrias. The genealogies of the Welsh Princes were traced back by old bards to Æneas and thence to Adam. The Britons were driven by each successive wave of invaders into the mountainous districts of Wales, and Wales was divided in the period of Roman invasion into six principalities under one supreme king; a Druid group and sacrificial scene were illustrated by slides. An account was given of the origin, worship, and functions of Druid priests; derivation of name is from δρῦς, an oak tree. Two unsuccessful attempts were made under William II. to subjugate the country; an invasion was led against Owen Gwynneth in 1157 under Henry II.; the rebellion of 1275 followed, leading to the annexation of Wales to England; then the rebellion of 1400, lasting seven years; Giraldus the Welsh historian was mentioned; and then the fame of Welsh for music; their favourite instrument being the harp. Their mode of fighting and national arms, their ornaments, boats or coracles, were mentioned. The characteristic want of good faith is noticeable among the Welsh, which has led to the term "welcher" and the nursery rhyme "Taffy was a Welshman." The lecturer then proceeded to give a short account of some of the places in Wales best known for their beauty and grandeur, with the aid of views in the lantern, the most beautiful of which were the Pass of Llanberis, the Fairy Glen, and the Pass of Aberglaslyn.

Saturday, October 30th.

P. G. Gates read a paper on the "Architectural beauties of Winchester."

The lecturer began by describing the chief beauties of architecture in the town: discussing chiefly the Cathedral and

the old College Hall, which are particularly beautiful. He then went on to recount the different visits paid by Royalty to the town, and its historical interest, which from the ancient date of its foundation, by William of Wickham, is very considerable. The lecture was brought to a close by some anecdotes related about the town, its building, and subsequent history, and connected with many names of great interest though of obscure date.

Saturday, November 20th.

Rev. A. Carr read a paper on "Hints on Work for the Natural Science Society."

A Society like ours has special opportunities of carrying its researches to every corner of Great Britain and even to distant countries. A very interesting record might be made of information thus gathered. It is quite unnecessary to write long and elaborate papers, and in future it might be arranged to have four or five short papers read on one evening, containing the results of holiday researches in various directions. Suggestions were then made as to the lines in which those investigations might be carried out in history, architecture, geology, art, and district dialects. This part of the subject was illustrated by an account of a visit to Marlborough's battle fields in Belgium, Ramillies, Oudenarde, and Malplaquet, and by a reference to some great pictures in foreign galleries, and to places in our own country memorable for great historical incidents.

Saturday, December 4th.

G. C. Allen, Esq., read a paper on "The Sun."

The distance, size, and constitution of the Sun have been matters of curiosity from the earliest times, yet it was not until the 16th century that any accurate knowledge of them was obtained.

Copernicus was the first to set aside the Ptolemaic system which regarded the Earth, and not the Sun, as the central body round which the planets moved; he also first suggested the rotation on its axis. Subsequent discoveries have established Copernicus's system as the basis of our present astronomical knowledge.

The mean distance of the Sun from the Earth is about 92,400,000 miles. There are several methods of attacking this problem: of which the most interesting perhaps is that in which observations are taken of the transit of Venus. These transits occur in regular cycles; the last was 1874: the next will be in 1882.

When the Sun's distance is known it is a comparatively easy matter to determine its size. The diameter of the Sun is $\frac{1}{107}$ of its distance, viz. 860,000 miles. Of the constitution of the Sun it is impossible to speak with certainty: we leave the realms of calculation for those of conjecture. The spots are the most noticeable features, being easily observed with moderate telescopic power. They are depressions in the photosphere or shining surface of the Sun: they are not permanent markings, and are confined to the neighbourhood of the Sun's equator. By their motion the Sun's axial rotation in 28 days was discovered. They vary in frequency and size during a period of about 11 years, and there seems reason to believe that a connexion exists between the spots and the Earth's magnetism.

The nature of the photosphere is even more a matter of conjecture; spectrum analysis has proved the existence of hydrogen and the vapours of various metals in the Sun: but whether the surface is solid liquid or gaseous we are at present unable to decide. Perhaps the best supported theory is that it is of a cloud-like nature.

The study of recent Eclipses has increased our knowledge of the Sun's surroundings very materially. The "red-flames" or "prominences" seen in total eclipses are proved to consist almost wholly of hydrogen; and hydrogen probably constitutes most of the Sun's real atmosphere. The beautiful silver-gray halo called the Corona which surrounds the Sun during eclipses is probably the core or inner part of the Zodiacal Light, which is seen in the tropics after sunset or before sunrise, and this again is probably due to the reflection of the Sunlight from myriads of meteoric bodies surrounding the Sun.

The fall of these meteors on the Sun's surface may, in Sir W. Thomson's opinion account for some of the continual supply of heat: the expenditure of heat being mainly recruited by the gradual contraction of the Sun's body.

The Sun's heat is no doubt wasting away, and in far distant ages there will come a time "when the Sun with all his planets welded into his mass will roll through space a cold and lifeless orb."

At the conclusion of the lecture a petrified crayfish from the Auvergne, accompanied by a short description, was exhibited by A. Spencer Wells.

Saturday, December 11th.

P. L. Bayly mi. read a paper on "The Geology of the Western Hebrides."

The purpose of this paper is to give a descriptive account of the *Geology* of the Western Hebrides, treating chiefly on the

rocks of Staffa and Skye. The Island of Staffa derives its name from a Scandinavian word, denoting a staff, so called from the straight and pillared look of its columnar basalt. It is considered the most perfect upheaval of basalt in that broken but continuous irruption which ranges from the Giant's Causeway northward through the Western Isles. The Crest of the Island is formed of broken and bent basaltic cloumns and amorphous basalt, but there are no recorded traces of Sedimentary Rocks.

Fingal's Cave (in Gælic, Elianbh Binn) or the Musical, is the great sight in Staffa, it is so named from the sonorous murmur made by the sea through the depths of the Cavern. There are many other Caves of less importance, among them, the Boat Cave and Mackinnon's Cave. The contrast between the Red and Black Coolins in Skye is particularly deserving of notice, the former rounded and without precipices presents an artificial smoothness, while nothing can exceed the grotesque and rugged outlines of the Black Hills. The syenite of the Red Hills is a granular admixture of felspar, grey quartz, and hornblende. The absence of cliffs is attributed to the pasty condition of the syenite when thrown up, but which did not prevent the lifting up and embedding of masses of sedimentary strata.

Hypersthene, a mineral nowhere else found in the kingdom, except at Ardnamurchan, forms the Black Cöolins. The finest specimens in the Crystallised form are found about Loch Coruisk, the centre of that volcanic action to which Hypersthene owes its origin. The Island of Eigg, off the coast of Skye, is one of the most remarkable looking Islands in the British Seas, formed of two ridges separated by a Central Valley. The Southern ridge called the "Scour of Eigg" is a vast wall of black basalt, curving round the crest of a great slope that reaches down to the sea. It is the most notable fragment of that great Miocene Continent streching from Antrim, in Ireland.

The paper concluded with an account of the Quiraing Mountain in Skye, famous for the wonderful formation of its rocks, which present, from the sea, the aspect of the ruins of a great City. But that more particularly entitled to the name of Quiraing consists of a verdant platform about 100 paces long by 60 broad.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Tuesday, February 3rd.

At a Committee Meeting, D. J. Medley and J. W. H. MacLaren were elected Members of Committee for the Term. T. C. Ross was elected Zoological Album Keeper. T. L. Mackesy and A. L. Harrison were elected to serve on the Committee for awarding the Eve Essay Prize, and R. R. Ottley was elected to help the President and Secretary on the Editing Committee.

Saturday, March 6th.

At a P.B.M., A. W. Chaldecott, P. L. Bayly, E. G. King, H. B. Hopgood, A. H. Spencer, W. R. Ancrum, and E. J. Drummond were elected Associates, and many Associates were proposed. The Secretary then read a letter, dated Dec. 3rd, 1879, from the Ex-President (The Rev. P. H. Kempthorne), in which it was explained in view of the Society's financially low condition that according to the Report for 1875, there remained in Dec. 1875, a balance of £10 14s. 0d. The Treasurer elected in Oct, 1876, found neither accounts nor receipted bills, but £4 1s. 6d. in the cash-box and an unpaid bill of £10 1s. 9d., although the receipts from Subscriptions between Dec. 1875, and Oct. 1876, must have been considerable. Since that time the Society has always paid its way, but has never been financially flourishing.

The Revs. C. Ll. Sanctuary and H. W. McKenzie were elected Honorary Members.

Wednesday, May 12th.

At a Committee Meeting, D. J. Medley and J. W. H. MacLaren were elected Members of Committee for the Term, T. Greenwood, R. G. Godwin-Austen, F. C. Eden, A. C. Skinner, C. J. Willock were elected Members.

Saturday, May 15th.

At a P.B.M., T. C. Pakenham was elected Ethnological Album Keeper, *vice.* T. L. Mackesy (resigned). A vote of thanks to Mackesy was carried for the work which he had done for the Report of 1878.

S. J. Chamier, R. H. Craddock, C. T. Clifton, G. R Crawford, F. E. Green, G. Elam, T. C. Pakenham, G. B. Behrens, Hon. W. D. Cairns, A. B. H. Drew, J. E. Hopgood, R. L. Hartley, B. P. Portal, S. H. Robinson. Some Associates were proposed, and on the motion of R. R. Ottley it was determined that Associates elected at the same meeting, take their places on the Society's list in Roll order.

There was some discussion on the method of collecting subscriptions.

A. E. Allcock, Esq. was elected an Honorary Member.

Saturday, June 5th.

At a P.B.M., the following were elected Associates:—F. E. F. Lambert, W. G. Allen, J. P. DuCane, F. H. Druce, R. A. H. Peel, H. M. Birley, C. P. Chapman, R. M. Quill, F. H. Green-Wilkinson, B. L. Sclater, W. H. Williamson, B. T. Pell.

The Secretary gave notice of some rules concerning the method of collecting subscriptions.

Saturday June 26th.

There was some discussion as to whether the scientific paper "Nature" should be placed in the School Library in order to give fellows an opportunity of reading it. It was eventually determined that the Society should cease to take in "Nature" on account of the expense. It was also decided that the N.S.S. Museum should be opened from 12.30 to 1.30 on Wednesdays, and that Members and Album-Keepers be allowed to borrow the Society's books; any book so borrowed to be returned at the end of a fortnight, if wanted by any other person qualified to borrow it; the Secretary to keep a list of books and be responsible for their safety.

Saturday, July 24th.

The Secretary proposed some rules of which he had given notice relative to the collection of Subscriptions: these were past amended as follows:—

(1) That the Treasurer be empowered to put up the Society's Board soon after the beginning of every Term a list of Members and Associates who have not paid their subscriptions, this list to be corrected as the subscriptions are paid.

(2) That at every P.B.M. the list of those who have not paid their subscriptions be read out by the President, and that at the last meeting of every Term those who have not paid be formally ejected by a vote of the Society. (The reading of names may be dispensed with, at the discretion of the President).

(3) That until he has paid his subscription for the Term, no one may use the privileges of a Member or Associate.

Some Associates were then proposed.

T. Greenwood resigned his Entomological Album, being about to leave. He gave a satisfactory account of his department, but it is a common complaint that fellows who are fond of Entomology generally give it up as they rise in the School, not liking to be seen pursuing butterflies and moths. After a vote of thanks had been carried by acclamation to Greenwood for the energy which he had shown for more than a year as Entomological Album-Keeper, C. R. Ashbee rose to give an account of his department—Botany. He mentioned that several additions had been made to the Botanical List in the last Report and that an improvement had been made in having a double column for masters and fellows.

F. A. Kirkpatrick, in resigning his office as Secretary, mentioned the unusual length of the Report for 1879, and pointed out that whereas during the Lent and Easter Terms, 1880, only one paper had been read before the Society by a Master (The President), no less than three had been contributed by fellows during that time. A vote of thanks was passed to Kirkpatrick for his services to the Society.

The President mentioned a suggestion which had been made to him by the Rev. A. Carr, that, in case fellows were deterred from writing papers by the length of those usually read before the Society, the Rugby system might sometimes be adopted of having two or three short papers read in one evening.

F. A. Kirkpatrick drew attention to the fact that the work of the Meteorological Section had been much neglected during the early part of the Term. This department had not always been carefully managed, but as a volunteer (H. T. Brooking) had offered himself for the post next Term, an improvement might be expected.

R. R. Ottley resigned his office as Treasurer, and a vote of thanks was passed to him for his services. The other Album-Keepers were re-elected, viz., C. R. Ashbee,—Botanical; R. A. Godwin-Austen,—Geological; T. C. Ross,—Zoological; T. C. Pakenham,—Ethnological.

F. A. KIRKPATRICK, *Secretary.*

Tuesday, September 28th.

A General Meeting of the Society was held in the Lecture Theatre, immediately followed by a Committee Meeting. This being the first meeting, the new officers of the Term had to be chosen: D. N. Pollock was elected Secretary, P. G. Gates Treasurer, H. T. Brooking, Meteorological, and P. L. Bayly, Entomological, Album-Keepers: N. Walter and R. R. Ottley were then elected Members of Committee for Term.

A. G. Hunter-Weston, A. G. Norris, J. A. C. Skinner, D. H. Barker, H. T. Brooking, C. P. G. Griffin, G. Walter, A. H. M. Peareth, A. S. Wells, were elected Associates.

A vote of thanks was passed to Mr. Penny for the Botanical Collections presented by him to the Society.

An the Committee Meeting, A. L. Harrison, P. G. Gates, P. L. Bayly, T. C. Pakenham, H. T. Brooking, were elected Members of the Society.

R. R. Ottley and P. G. Gates were then elected Judges for awarding the "Eve Essay Prize."

Saturday, October 16th.

A P.B.M. was held, at which G. Caldecott was elected, and J. C. Cox, W. Sillem, G. D. White were proposed for Associates.

Saturday, October 30th.

A P.B.M. was held, at which G. D. White, W. Sillem, J. C. Cox were elected Associates.

Mr. Tuck and Mr. Bull were elected Honorary Members.

Saturday, November 20th.

At a P.B.M., held on this day, H. H. Peacock, J. H. P. Graham, A. D. W. Pollock were proposed for Associates.

Saturday, December 4th.

A P.B.M. was held, at which H. H. Peacock. J. H. P. Graham, A. D. W. Pollock were elected Associates.

H. G. Lyons also was proposed for an associate.

A pair of Capercaillies were presented to the Society by the Hon. H. J. Cairns: a few words were said about them by the President, who also proposed a vote of thanks.

Saturday, Dec. 11th.

A P.B.M. was held at which H. G. Lyons was elected Associate, R. T. Turnbull, E. W. Monkhouse, E. W. Besley, were proposed for Associates.

P. L. Bayly resigned his Album, a vote of thanks to him for the work he had done for the Society was proposed by the President and carried by acclamation.

D. N. POLLOCK, *Secretary.*

FIELD DAYS AND EXCURSIONS.

On May 6th, being Ascension Day, and therefore a whole holiday, a party of the Natural Science Society paid a visit to Farnham Castle. Accompanied by Mr. Saunder, the President, and Mr. Goodchild, one of the Vice-Presidents, we started from Great Gate shortly after Chapel, and driving by Edgbarrow we soon found ourselves on the road to the Military College. We drove through the grounds of the College and exchanged salutes with certain O.Ws., who were apparently engaged in making preparation for the athletic sports. Passing on by Blackwater, Frimley, and Farnborough Station, we reached Aldershot about one o'clock. Various attempts at making scientific observations *en route* had completely failed hitherto, owing to the attractive character of the contents of a large hamper, which was carried under the box-seat, but the empty papers were now distributed to the winds and the empty bottles consigned to the place whence they had come, so that our geological members had at last time to point out the scientific beauties of the interesting out-crop of the chalk, to which our rude forefathers have given the unpoetical name of Hog's Back. Gladly escaping from the dreary huts and the dust-clouds of Aldershot, we soon found ourselves driving through the hop-gardens into the pretty little town of Farnham. After admiring an old-fashioned house, which has recently been restored and turned into a bank, we ascended the hill to the Castle gate. The Master had been kind enough to procure us permission from the Bishop of Winchester to visit the whole of the building; and we were most courteously conducted through all the principal rooms. The core of the house seems to be the massive stone-

work of the ancient Castle, built in the time of king Stephen, but most of the building has been much altered and modernised. We were peculiarly interested with the fine wood-carving in the chapel, which was executed by Grinling Gibbons, and we were also struck by the air of comfort about a delightful old library that must have been fitted up early in the last century. The view from all the front windows is most charming, a grand stretch of rich green country is in sight East and West for miles, and immediately below, near enough to be seen, but so far that no sound of uproar reaches the Castle, is the busy little main street of Farnham, full of market-women and well-to-do farmers. On leaving the main buildings we were conducted by a civil gardener to the ancient keep, the interior of which is laid out as a fruit garden. We had to clamber up the broken stairs, where many a stout knight must have met his death-wound in the days of baronial warfare, and on emerging near the top of the ancient wall, we found that by climbing a mass of Elizabethan masonry, which is reared upon the foundation of the Norman work, we could obtain a splendid view of the Bishop's park and of the surrounding country in all directions. We satisfied the gardener's just pride by visiting his hot-houses and paying a tribute of well deserved praise to his magnificent ferns, his healthy looking pines, and his long tiers of ripe strawberries; and then, as time pressed, we descended through the town, and started on foot for the ruins of Waverley Abbey. These are about two miles from the town on the banks of a pleasant lake near the river Wey, from which the monks must have got abundance of Carp in Lent. The crypt of a large building, said to have been the friars' dormitory, is the most interesting relic that remains; all the buildings have been sadly desecrated by the passion of modern British pilgrims for inscribing their names everywhere in the largest possible characters. We found time would not allow us to visit Mother Ludlam's cave on the opposite side of the Wey within the grounds of that Moor Park where the author of Gulliver's Travels slaved as a private tutor for twenty pounds a year and a meal at the upper servants' table. We returned reluctantly to

the town, where we found tea waiting for us in a cool room opening into the fine old garden of the Bush Hotel. Starting about six we drove back by nearly the same road that we had travelled in coming, and we enlivened the way by continual choruses to songs from the "Hopetoun Stairs."

On Monday, Nov. 1st, an expedition of the Society was made to Reading, under the guidance of Mr. Saunder and Mr. Allen, who had kindly undertaken to accompany us. Starting from Great Gate, we passed along the old road through Wokingham, and thence by Earley straight to Reading. There, on our arrival, having made necessary arrangements at the Queen's Hotel, we started for Huntley and Palmer's biscuit manufactory, the principal object of the expedition; but finding that we were three quarters of an hour too early, as the workmen had not returned from their dinner, we made our way thence to the old Abbey of Reading, which is the remains of a very large building. Many of the walls are standing, but not a fragment of perfect stone-work is to be seen anywhere. On returning to the biscuit manufactory we were taken first into the mixing department, where the flour, sugar, and eggs are mixed, then to the moulding department, where we saw the different shaped biscuits being formed, and lastly to the baking ovens; on higher floors we saw the cakes made, and higher still the biscuit tins being prepared for use, and watched the packing cases ready for the railway rolled down long inclined planks to the station below. The stamping machines were most admirable, and the whole manufactory was wonderfully arranged. After tea at the hotel, we started home again, and the drive was enlivened with songs and sounds of all kinds.

N.S.S. PRIZES.

H. Denison Pender, Esq., having announced his desire of perpetuating the memory of the first President of the Society (H. W. Eve, Esq.) by presenting annually a prize of the value of £5 for the best essay on some scientific subject written by a Member or Associate of the Society, the Society has gratefully accepted Mr. Pender's offer, and the following regulations for the competition have been drawn up by the Committee.

1. That the prize be called "The Eve Essay Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two ordinary Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term) with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bona fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President.

In order to prevent disappointment, competitors are recommended to mention the subjects chosen, to the President before writing their essays.

Preference will be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

6. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

7. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1880 was awarded during Michaelmas term to T. L. Mackesy for an essay bearing the title "Geological Notes." In future years the prize will be awarded according to Rule 3 during the Easter term.

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made during the Easter term. The specimens must be caught or bred by the boy himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The winners of these prizes in 1880 were

(1) E. G. King. (2) G. Elam, W. H. Williamson, æq.

BOTANICAL REPORT.

No additions to the Flora of the neighbourhood have been made this year.

Observations have been recorded as usual, but it has not been thought necessary to publish a detailed list. The most energetic observers have been J. W. Evans, G. H. Marsh, T. C. Pakenham, A. L. Griffith.

A new feature in our Botanical work has been the exhibition on three occasions of bouquets of wild flowers and grasses collected by Members and Associates of the Society.

During the past year a large collection of British flowers and lichens has been presented to the Society by Rev. C. W. Penny.

C. R. ASHBEE,

Botanical Album Keeper.

ENTOMOLOGICAL REPORT.

LEPIDOPTERA.

The following are the only new specimens of Lepidoptera found this year, ending Dec. 15th, 1880.

FAMILIA II.—NOCTURNI.

GENUS.—SPHINGIDÆ.

Chœrocampa Celerio ..Silver striped Hawk Moth

Found at York Town and presented to the Society by Rev. George Yonge.

FAMILIA III.—GEOMETRÆ.

GENUS II.—ENNOMIDÆ.

Himera peunaria	..Feathered Thorn ..	Oct. 29 ..	E.G.K.

FAMILIA XIII.—PTEROPHORI.

Alucita polydactyla	..Twenty Plume ..	Oct. ..	J.L.B.

This has been found before but has dropped out of the list.

P. L. BAYLY,

Entomological Album Keeper.

Finders { J. L. B. = J. L. Bevir, Esq.
E.G.K. = E. G. King.

ARACHNIDA.

A great deal of good work was done during the spring and the summer in collecting spiders. About three thousand specimens were obtained, and, after a considerable number of duplicates had been rejected, there remained enough to form the basis for a permanent collection. The Rev. O. Pickard Cambridge has most kindly overhauled these specimens during the Christmas holidays, and has enabled us to name them in accordance with the most recent system of nomenclature. We shall consequently be able to commence the new season with the advantage of having at hand a considerable number of correctly named specimens for reference, an advantage which we have not previously enjoyed. Mr. Cambridge's kindness enables us to publish a more complete list of our summer spiders than has previously appeared in this report; we have nearly twenty new names to chronicle, but many of these are names of species that are now regarded as distinct, though formerly classed together.

The following are the spiders which have been identified by Mr. Cambridge among those found last year, and we hope to considerably increase the number after another twelve months of work.

Amaurobius Similis, Bl.
Agelaena Labyrinthica, Clk.
Agroeca Brunnea, Bl.
Cheiracanthium Carnifex, Westr.
Clubiona Brevipes, Bl.
,, *Pallidula, Bl.*
,, *Terrestris, Clk.*
Cyclosa Conica, Clk.
Dictyna Arundinacea, Linn.
,, *Latens, Walck.*
,, *Variabilis, C. L. Koch.*
Epeira Acalypha, Walck.
,, *Agelaena, Walck.*
,, *Cornuta, Clk.*
,, *Diademata, Clk.*
,, *Quadrata, Clk.*
,, *Sollers, Walck.*
,, *Umbratica, Clk.*
Epiblemum Cingulatum, Panz.
,, *Scenicum, Clk.*
Episurus Truncatus, Walck.

Euryopis Inornata, Cambr.
Hasarius Falcatus, Clk.
Hecaerge Spinimana, Bl.
Lethia Humilis, Bl.
Linyphia Circumspecta, Bl.
,, *Clathrata, Sund.*
,, *Dorsalis, Wid.*
,, *Fuliginea, Bl.*
,, *Minuta, Sund.*
,, *Montana, Clk.*
,, *Obscura, Bl.*
,, *Pusilla, Sund.*
,, *Socialis, Sund.*
,, *Tenebricola, Wid.*
,, *Triangularis, Clk.*
Lycosa Amentata, Clk.
,, *Herbigrada, Bl.*
,, *Nigriceps, Thor.*
,, *Palustris, Linn.*
,, *Pullata, Clk.*
,, *Riparia, C. L. Koch.*
Marpessa Muscosa, Clk.
Meta Segmentata, Clk.
Misumena Vatia, Clk.
Neriene Atra, Bl.
Ocyale Mirabilis, Clk.
Pachygnatha Degeerii, Degeer.
Philodromus Aureolus, Clk.
,, *Dispar, Walck.*
Phyllonethus Lineata, Clk.
Pirata Piraticus, Clk.
Steatoda Bipunctata, Linn.
Tarantula Andrenivora, Walck.
,, *Pulverulenta, Clk.*
Tegenaria Atrica, C. Koch.
,, *Derhamii, Scop.*
Tetragnatha Extensa, Bl.
Theridion Bimaculatum, Linn.
,, *Formosum, Clk.*
,, *Denticulatum, Walck.*
,, *Formosum, Clk.*
,, *Pallens, Bl.*
,, *Pulchellum, Bl.*
,, *Sisyphium, Clk.*
,, *Tinctum, Walck.*
,, *Varians, Hahn.*
Tiballus Oblongus, Walck.
Trochosa Ruricola, Degeer.
,, *Terricola, Thor.*
Walcknaera Alticeps, Camb.
,, *Pumila, Bl.*
Xysticus Pini, Hahn.
Zilla X-notata, Clk.

W. G.

ZOOLOGICAL REPORT.

The seeming want of interest in this most attractive department of natural history is greatly to be deplored. It is true that there is no stimulus given to this pursuit in the way of prizes, but this cannot be hoped for; and the occurrence of birds and animals may be noted on any ordinary walk. There are a great number of birds and animals which have been plentiful, but which are now getting rarer every year, such as the kestrel, the sparrow-hawk, the magpie, the stoat, the weasel, &c. This is of course owing to the vigilance of the gamekeepers; thus a few years ago, a single gamekeeper killed no less than four kestrels and one sparrow hawk in one week, but I have heard of no similar case during the past year: I think, however, that jays, which are also much persecuted by the gamekeepers, do not seem much to decrease, this is perhaps from the fact that these birds have two broods each year.

A large number of snipe have been noticed this year near the lakes by different masters and fellows, stray birds have been seen before, but they have never, I think, been noticed in such large quantities. I think also more nightingales have been heard in this than in former years.

During the past year the following presents have been made to the Society: two Capercaillies (Tetrao urogallus) male and female, presented by Hon. H. J. Cairns: two Australian lizards from Brisbane (species undetermined), presented by Lord Henry Phipps.

T. C. ROSS,

Zoological Album Keeper.

METEOROLOGICAL REPORT.

During the early part of the year the observations were not taken with sufficient regularity to render a report possible.

September. At the beginning of the month the weather was fine, but it changed about the middle; although the weather was cloudy there was not much rain.

			Corrected to sea level.
Mean of Barometer		29·646	29·861.
Highest	,,	30·150	30·365 (on the 29th).
Lowest	,,	29·	29·215 (on the 14th).
Mean of Maximum Thermometer			73°·8.
,, *Minimum*		,,	50°·3.
Highest Maximum		,,	84°·5 (on the 21st).
Lowest Minimum		,,	40°·0 (on the 19th).

Mean of Dry Bulb 58°·43.

,, *Wet* ,, 58°·40.

,, *Solar Maximum* 115°·7.

Rainfall $3\frac{1}{10}$ inches.

Wind chiefly W.N.W. and N.W.

October. Weather rather wet, heavy rain on the 10th (0·8 inches) and on the 27th (0·93 inches). Snow fell on the 20th.

			Corr. to sea level.
Mean of Barometer		29·532	29·752.
Highest	,,	29·975	30·195 (on the 13th).
Lowest	,,	28·500	28·725 (on the 28th).
Mean of Maximum Thermometer			53°·46.
,, *Minimum*		,,	38°·45.
Highest Maximum		,,	67°·00 (on the 8th).
Lowest Minimum		,,	24°·00 (on the 24th).
Mean of Dry Bulb		,,	58°·43.
,, *Wet* ,,		,,	58°·40.
,, *Solar Maximum*			89°·36.

Rainfall 6 inches.

Wind chiefly N.E., N.N.E.

November. The beginning of the month was dry. There were four hard frosts. Rain fell on ten days, the greatest rainfall being on the 16th (0·4 inches). Snow fell on the 18th.

			Corr. to sea level.
Mean of Barometer		29·514	29·738.
Highest	,,	30·075	30·299 (on the 30th).
Lowest	,,	27·700	27·974 (on the 10th).

Mean of Maximum Thermometer 49°·60.
,, *Minimum* ,, 34°·98.
Highest Maximum ,, 60°·50 (on the 1st).
Lowest Minimum ,, 19°·00 (on the 22nd.)
Mean of Dry Bulb ,, 41°·66.
,, *Wet* ,, ,, 41°·66.
,, *Solar Maximum* ,, 72°·53.
Rainfall 2½ inches.
Wind chiefly N.E. and S.W.

December. Weather unusually warm for the time of year, the thermometer not registering below 26°. There was no rain.

			Corr. to sea level.
Mean of Barometer		30·192	30·416.
Highest	,,	30·30	30·524 (on the 7th and 8th).
Lowest	,,	29·70	29·924 (on the 13th).

Mean of Maximum Thermometer 50°·38.
,, *Minimum* ,, 38°·61.
Highest Maximum ,, 55°·00 (on the 11th).
Lowest Minimum ,, 26°·00 (on the 3rd).
Mean of Dry Bulb ,, 43°·84.
,, *Wet* ,, ,, 43°·84.
,, *Solar Maximum* ,, 69°·84.
No *Rainfall.*
Wind chiefly S.S.W. and W.N.W.

Observations were discontinued on the 13th of this month.
N.B. The Thermometers are all on Fahrenheit scale.
Readings of Barometer are corrected to sea level only.

H. T. BROOKING,
Meteorological Album Keeper.

ETHNOLOGICAL REPORT.

As it has not been thought necessary to print a complete list of all the objects in the Museum, only the principal donations of the past year are inserted:

Two Shields, three pair Shoes, two pair Silver Bracelets, one pair earrings, from the neighbourhood of Candahar, presented by Lady Fordyce.

One Ghazi Firelock and one Ghazi Jezail or Sword, picked up at Ghuznee, by Lieut. Montagu Battye, 59th Regt. (O.W.)

Two nests of the Trap-door Spider, from Caen, presented by A. C. M. Waterfield.

A skin of the Morelia Variegata or Carpet Snake, measuring 8 ft. 6 in., presented by G. M. Archdale.

A Diagram Model of the Steam Engine Slide and Expansion Valves, presented by C. L. Simpson.

T. C. PAKENHAM,

Ethnological Album Keeper.

TWELFTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1881.

"Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος οὐτοῦ δύναμις καὶ Θειότης."

'Επιστολὴ πρὸς 'Ρωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.
1882.

TWELFTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1881.

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Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

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TWELTH ANNUAL REPORT

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Contents.

PREFACE.

In our last Report we stated that it was hoped that some means might be found for carrying on the Prize which had been annually given to the Society by Mr. Denison Pender (O.W.). We have this year to express our thanks to Mrs. Pender who has most generously announced her intention of continuing the Prize, which is now to be called "The Pender Prize," in memory of her son.

A great improvement, due to the energy of the Album Keepers, has taken place this year in the registration of the Meteorological observations; we are ourselves conscious of the numerous defects—some of them at present beyond our power to remedy—which will appear to any careful readers of the records, but most of these we hope to be able in time to correct.

Some good work has been done in the Entomological section, and several new names have been added to our lists both of Lepidopetera and of Spiders.

We may also congratulate the Society on the satisfactory balance sheet presented by the Treasurer.

Our thanks are again due to Mr. P. H. Carpenter for an interesting Lecture on "The Animals which make Limestone," to Capt. Cooper-King, F.G.S., for one on "Military Arms," and to The Rev. W. D. Fenning for one on "Greek Sculpture."

RULES.

1. That this Society be called the "WELLINGTON COLLEGE NATURAL SCIENCE SOCIETY."

2. That the Society consist of Honorary Members, Corresponding Members, Members, and Associates: the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary, and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of Two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of Management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., aud a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the Term.

18. That at every P. B. M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors, except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description, further, that all Exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers be told off to collect the Exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the Sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed Five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

OFFICERS.

PRESIDENT—S. A. SAUNDER, Esq.
VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD.
SECRETARY—D. N. POLLOCK. R. B. OTTLEY.
TREASURER—T. HARRISON. A. G. HUNTER-WESTON.

ALBUM KEEPERS.

ENTOMOLOGICAL—E. G. KING.
BOTANICAL—C. R. ASHBEE.
METEOROLOGICAL—H. T. BROOKING. D. H. BARKER.
ZOOLOGICAL—T. C. ROSS. VACANT.
GEOLOGICAL—R. A. GODWIN-AUSTEN. H. G. LYONS.
ETHNOLOGICAL—T. C. PAKENHAM.

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THE LORD BISHOP OF TRURO.

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N. WALTER.†
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E. G. KING.
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E. R. BENSON.
R. G. COKE.‡
H. H. NOEL.
L. F. GREEN-WILKSON.
G. G. SANDYS-LUMSDAINE.
G. H. DAVIDSON.
V. H. BOWRING.
W. B. STAUNTON.
M. DALE.
H. H. PEEL.

* Left Lent, 1881. † Left Midsummer, 1881. ‡ Left Christmas, 1881.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College		...	N.H.S.
Cheltenham	,,	...	N.H.S.
*Marlborough	,,	...	N.H.S.
Clifton	,,	...	N.H.S.
*Rugby School	...	...	N.H.S.
*Dulwich College	...	...	N.H.S.
*East Kent	,, ...	...	N.H.S.
*Haileybury	,, ...	...	N.H.S.
*Birmingham School		...	N.H.S.

*U. S. Geological Survey.

Linnæan Society.

Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

*Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.	£	s.	d.
Balance in hand	0	16	2
Subscriptions:			
Lent Term—Honorary Members ...	1	7	6
,, Members and Associates...	3	12	0
Easter Term—Honorary Members ...	1	2	0
,, Members and Associates	3	10	6
Michaelmas Term—Honorary Members	2	14	6
,, Members and Associates	3	10	6
Grant from the Master	5	0	0
By sale of Report	6	16	0
By loan of lantern...	0	5	0
	£28	14	2

Examined and found correct, S. A. SAUNDER,
Dec. 17, 1881.

Expenditure.	£	s.	d.
Daily Weather Charts	1	0	0
Commissionaire, for keeping Charts ...	0	7	6
Negretti and Zambra, for instruments ...	1	9	6
Ladd, for refilling gas jars	1	10	0
Lime cylinders	0	3	6
Hire of slides	0	9	6
Newton, for desk	0	14	3
Carriage of parcels...	0	11	10
Lepidoptera Prize	0	10	0
Bishop, for Report...	7	6	0
,, for printing tickets and notices ...	1	0	8
Postage	0	6	5
Balance in hand	18	5	5
	£28	14	2

A. G. HUNTER-WESTON, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 5th.

The President read a paper on "Molecules."

The object of this lecture was to explain some of the facts which are now certainly known with regard to the structure of matter. All matter is built up of very small particles, each of which is called a molecule. These molecules are in rapid motion among one another, and this motion is the physical cause of what we call heat. The pressure of the atmosphere is due to the blows which the molecules of air are continually showering upon all bodies at the Earth's surface.

It has been proved that the molecules of light gases must move more rapidly than those of heavier gases, when under the same conditions of pressure and temperature. Some experiments were made, illustrating this law, and in one of these it was shown how this property of gases might be employed in such a way as to cause an escape of fire-damp in a coal-mine to give warning of its existence by ringing an electric bell.

The velocities with which the molecules of different gases move may be calculated with great accuracy. In the case of hydrogen, the molecules of which move more rapidly than those of any other gas, the average velocity is about 70 miles a minute; the molecules of air move at an average rate of about 17 miles a minute.

The molecules of a gas are continually knocking against one another; a molecule of hydrogen has, under the ordinary conditions of pressure and temperature, about 17,750 millions of collisions a second. The size and weight of a molecule have also been roughly calculated. About 50 millions of hydrogen molecules placed side by side would form a row one inch in length, whilst about two hundred thousand millions of millions of millions of them would weigh one gramme.

The difference in constitution between gases, liquids, and solids, is that, in the first, the molecules spend only a short time in contact with one another, and during much longer periods move freely: in a liquid the molecules move about from one part of the substance to another, but they are in contact with other molecules during almost the whole motion: in solids the molecules never move far from one position, but vibrate about this as if they were held by elastic strings.

The rotation of the arms of a radiometer is fully accounted for by the action of heat, in causing the molecules of the gas left inside to rebound from the hot surfaces of the vanes with increased velocities. Some of Mr. Crookes' high vacua tubes were exhibited, and the phenomena presented by them explained as due to the action of the molecules which still remain, even at these high exhaustions. Amongst the tubes was one shewing the dark space round the negative pole, several showing the phosphorescence excited in various substances under the molecular bombardment, a tube containing some potash which when heated injured the vacuum and shewed how the appearances varied with the amount of gas in the tube, an electrical radiometer and a few others.

The structure of a molecule was not discussed; to have entered upon this would have been to leave the regions of knowledge for those of conjecture, whereas the former alone had furnished materials for a lecture of more than the usual length.

The following tables were adapted from the calculations of Professor Clerk Maxwell.

Accurate.

Average velocities of molecules at 0°C.

Hydrogen	1859	metres	per	second,	about	70	miles per	minute.
Oxygen	465	,,	,,	,,	,,	17	,, ,,	,,

Approximate.

Number of collisions per second at 0°C and 760 mm.

Hydrogen 17,750,000,000.

Oxygen 7,646,000,000.

Mean free path at 0°C and 760 mm.

Hydrogen $\frac{1}{10,000}$ millimetre, or $\frac{1}{250,000}$ inch.

Oxygen $\frac{1}{18,000}$,, ,, $\frac{1}{450,000}$,,

ROUGH.

Diameters of molecules.

Hydrogen $\frac{1}{2,000,000}$ millimetre or $\frac{1}{50,000,000}$ inch.

Oxygen $\frac{1}{1,300,000}$ " " $\frac{1}{33,000,000}$ "

Number in one gramme.

Hydrogen 200,000,000,000,000,000,000,000.

Oxygen 12,500,000,000,000,000,000,000.

Number in one cubic inch at standard pressure and temperature.

800,000,000,000,000,000,000.

The Rev. P. H. Kempthorne proposed a vote of thanks, which was carried unanimously.

Saturday, February 19th.

N. WALTER gave a lecture on "Explosives."

The Rev. P. H. Kempthorne proposed a vote of thanks, expressing his entire belief in the efficacy of the experiments given, for their forcible as well as their illustrative power.

A. E. Keith presented an Ostrich egg: for which a vote of thanks was passed on the proposal of the President.

At this meeting more than 120 were present.

Saturday, March 5th.

H. C. STEEL, Esq. read a paper on "Sound," illustrated by experiments.

A vote of thanks, proposed by the Rev. P. H. Kempthorne, was unanimously passed. Present, 100.

Saturday, March 19th.

T. L. MACKESY read a paper, entitled "Geological Notes," being the successful Essay for the Eve Essay Prize.

This essay may be divided into two parts, the first being the results of an examination of the rock known in Norfolk as Carstone—the second of some work among the lower Oolites and Lias of the Northampton area.

As to the first part, when the observations mentioned below were made, the Survey map of the extreme N.W. corner of Norfolk had not been published, and all we could get to supplement our own observations were some scattered notices in general text books. The section exposed in Hunstanton cliff exhibits the following succession of Rocks.

Lower White Chalk
Chalk Marl
Red Chalk
Carstone
Clay

I. At the bottom of the Carstone we found an Ammonite, which we believed to be *Ammonites Deshayesii*, a characteristic fossil of the Lower Greensand of Folkestone, Sandgate and Hythe, and also found in the upper portion of the Speeton clay in Yorkshire, which according to the late Sir C. Lyell is on the same horizon as the Hythe beds.

Assuming then the identification of the ammonite to be correct, the scanty and altogether inadequate palæontological evidence afforded by only one fossil, if it points out anything does certainly lead to the conclusion, or rather, to be more guarded, not contradict it, that the Carstone is of Lower Greensand age.

II. The Stratigraphical evidence must next be considered.

The local guide book, not in itself a weighty authority, states that the Kimmeridge clay crops out at the S. end of the beach between high and low water mark.

The clay underlying the Carstone, which on our last visit we noticed when pressed for time and not able to examine, having on former occasions sought for it in vain, we must assume to be this Kimmeridge clay. Now the Kimmeridge clay is of Upper Oolitic or Portlandian age.

So then the Carstone lies between the Portlandian strata and the Red chalk, which latter formation only occurs elsewhere in England on the Yorkshire coast. Of it, Professor Ramsay says "Mr. Judd has shewn that at the S. end of Filey bay, in Yorkshire, we have the actual marine representatives of the Continental Neocomian strata. These Yorkshire beds were formerly called Speeton clay, and lie between the uppermost Oolitic strata of the district which are Portlandian, and the Red chalk." Comparing then the Hunstanton and Filey sections we have in the latter,

(1) Red chalk.
(2) The marine representatives of the Continental Neocomian strata, otherwise called Speeton clay.
(3) Portlandian Rocks.

And in the former (1) Red chalk.
(2) Carstone.
(3) Portlandian Rocks.

From this it will be seen that the Carstone occupies identically the same position as the Speeton clay of Neocomian age does in Yorkshire.

This stratigraphical evidence, supported, or perhaps not contradicted, by the palæontological evidence that *Ammonites Deshayesii* occurs in all three formations Greensand of Hythe, Carstone, and Speeton clay, seems to point to the conclusion that these three formations are contemporaneous deposits.

As to the Red chalk, Mr. Judd says that it cannot be of later age than the Upper Greensand, and may be as early as the Gault.

It occurs in the Hunstanton district at Snettisham, about 3¾ miles to the south of the cliff section, where it is on the surface, overlying the Carstone, and again in a pit close to Hunstanton station. It is fossiliferous—the following having been found:

Terebratula biplicata
Belemnites minimus
,, ultimus
Micraster sp. ?
Spongia paradoxia
Serpula socialis
Lima spinosa
Inoceramus concentricus
Terebratula obtusa, Sow.
,, dutempleana, D'Orb.

These last five we did not find ourselves, but saw in the collection of the late Mr. Samuel Sharp, in the Northampton Museum.

Mr. Judd's statement, quoted above, is supported by the facts that this rock occurs between the Chalk Marl and Carstone, which we have attempted to identify with the Lower Greensand, and also by the fact that Terebratula biplicata is found in U.G.S., Inoceramus concentricus in U.G.S. and Gault, and Belemnites minimus in Gault.

We now come to the second part.

The part of the Northampton area under discussion is mapped in sheet 53 N.E. of the Geological Survey, and lies immediately to the N.W. of the town of that name.

The sections of the lower Oolites undergo a great change between Bath and Northamptonshire. The rocks in the latter district seem totally unlike in structure to, and appear not to

have been deposited under the same conditions as the rocks on the same geological horizon in the S.W. of England where the succession is:

Cornbrash
{Forest Marble}
{Bradford clay}
Bath Oolite
Stonesfield Slate
Fullers' Earth
Inferior Oolite
Midford Sands
Upper Lias clay. Etc.

Working from Bath towards Northampton we find that the Fuller's earth thins out in Gloucestershire a few miles W. of Stow-on-the-Wold, so that the Great (or Bath) Oolite overlies the Inferior Oolite, as may be seen about 15 miles from Cheltenham, at Broadway, where the lowest zone of the Great Oolite with the Stonesfield slate at its base consists of sandy flags, which in some parts of Oxfordshire become arenaceous. This very same change also takes place in the Inferior Oolite in the same area, and thus two series of sandy beds come together, attenuated representatives of the thick limestone deposits of the lower zone of the Great Oolite and the Inferior Oolite. These sandy beds of the Inferior Oolite are sometimes ferruginous, as at Worton between Steeple Aston and Banbury. The whole mass of arenaceous beds is called Northampton sand, lying between the upper zone of the Great Oolite and the upper Lias clay, the Midford sands having died out. The division is hard to determine till we reach the Nen basin, where the sandy representative of the lower zone of the Great Oolite becomes mainly argillaceous and assumes an estuarine character, containing 'bands of sandy stone with vertical plant markings and layers of shells, sometimes marine, sometimes freshwater, having clearly been accumulated under an alternation of marine and freshwater conditions such as takes place in the estuaries of rivers.' (Mr. Judd.) In this area then they have been named the Upper Estuarine series. To return to the sandy and ferruginous beds which have replaced the Inferior Oolite limestone, in Northamptonshire they may be divided into two parts, the upper being also of estuarine origin, containing plant remains, seams of lignite, small underlays, and freshwater bivalves, as Cyrena. This part is called the Lower Estuarine series. The lower portion is ferruginous, and varies from an incoherent sand to a rough sandy building stone, and is called the Ironstone beds, which when present *always* constitutes the lowest member of the Oolites and lies immediately on the Lias clay. These estuarine characters are not assumed suddenly, the change being gradual from marine to estuarine conditions in a

contemporaneous deposit. About 14 miles N.E. of Kettering these two estuarine series are separated from each other by the Lincolnshire Limestone which is equivalent to the Inferior Oolite of the S.W. It comes in like a wedge and spreads through Lincolnshire, being underlaid by laminated flagstones, called Collyweston slate, which was once supposed to be on the same horizon as the Stonesfield slate, but at last their true position was pointed out.

The Northamptonshire section then is this:

Cornbrash			Lower Oolite
Clay	Great Oolite		
Limestone			
Upper Estuarine Series			
Lincolnshire Limestone and Collyweston Slate		Inferior Oolite	
Lower Estuarine Series	Northampton Sand		
Ironstone beds			
Upper Lias clay, etc.			

Of the several formations appearing on the map above-mentioned, we only examined the Great Oolite limestone, the Ironstone and the upper Lias clay. The Ironstone caps the summits of the undulations of the country, the clay hollows between being traversed by brooks which have eroded the land.

The following fossils were found in the Great Oolite Limestone

Actinozoa.	Many traces.
Echinodermata.	Clypheus sp. ?
Brachiopoda.	Rhynchonella concinna.
	Terebratula maxillata.
Monomyaria.	Ostrea Sowerbii.
Dimyaria.	Cypricardia (nuculiformis ?)
	Modiola (imbricata ?)
	Trigonia sp. ?
	Pholadomya sp. ?
Gasteropoda.	Two species.
Pisces.	Teeth of fish.

The above came from quarries near Kingsthorpe and Dallington.

At Harleston and Duston the following fossils were found:

Plant remains
Astarte elegans
Trigonia sp. ?
Belemnites sp. ?
and many Lamellibranchiate bivalves.

Near Long Buckby the junction of the Ironstone and underlying Lias clay was observed.

From the Upper Lias clay we took many fossils, among them

Ammonites communis
,, Holandrei
,, bifrons
,, Serpentinus.

The Rev. A. Carr proposed a vote of thanks: and alluding to the lamented death of Mr. Pender (O.W.), stated that he had received a letter from Mrs. Pender, saying that she wished to continue the prize Mr. Pender had formerly given, but on condition that it should now be in memory of Mr. Pender himself.

The President expressed the Society's sympathy with Mrs. Pender for her great loss, and thanks for her kindness and generosity.

Saturday, May 7th.

E. A. Mitchell-Innes read a paper on "Coal and Coal Mines."

E. K. Purnell, Esq. proposed a vote of thanks.

Saturday, May 21st.

P. H. Carpenter, Esq. gave a lecture on "The Animals which make Limestone."

Mr. Carpenter began by describing what limestone is; how that it is a rock which is extremely widely distributed, and occurs more or less extensively developed in almost every geological formation, and indeed many such as the Laurentian, the Cretaceous, and the greater part of the Carboniferous are mainly composed of it. Still, as we should naturally expect since it is so extensively developed, it presents great varieties of texture and composition even in the same formation, or in the same stratum. Limestones occur of nearly all degrees of purity, from specimens of chalk containing about 96 per cent. of pure carbonate of lime, to limestones containing as much as 50 or 60 per cent. or even a larger percentage of earthy matter and other impurities.

Limestone is mainly formed by the skeletons and calcareous portions of animals and organisms inhabiting water, which have extracted during their lifetimes the carbonate of lime from the water, in which it was dissolved, to make or enlarge their skeletons and shells as occasion demanded. This carbonate of lime dissolved in the water was brought down into the sea by

rivers which have obtained the soluble bi-carbonate from the action of rain-water, holding carbonic acid in solution, upon calcareous rocks. In the Thames this amounts to about 1000 tons per day at Kingston; so when we compare the size of the Thames and the volume of water brought down by it to the sea, with other rivers, such as the Amazon, the Ganges and the Mississippi, we begin to realize what a vast amount is borne down into the sea for the support of its inhabitants.

Among the animals whose remains help to make up the thousands of feet of limestone which occur, the family of Crinoidea may be mentioned, numbers of specimens of which are found fossil and especially in the so-called Crinoidal limestone which is almost wholly composed of these remains. Several slides were exhibited showing specimens both of fossil, and of still existing species.

Stalked Crinoids or Sea Lilies consist of a body supported on a jointed and flexible stalk, by which they are fixed to the sea-bottom during the whole or a part of their lifetime. The body of the Crinoid is furnished with armswhich are subdivided into smaller arms and filaments.

They range from the Lower Silurian Period to the present day, and offer a good example of a group which early obtained its maximum development, and which has now dwindled down to some two dozen surviving species.

Amongst the fossil species the well-known and common *Poteriocrinus crassus*, *Platycrinus tricontadactylus* of the Carboniferous, and also the elegant *Pentacrinus Briareus* of the Lias may be mentioned, whose innumerable delicate filaments are especially striking. The genera *Apiocrinus* (Pear Encrinites) were also noticed, and of the still surviving species the *Pentacrinus Maclearanus* is very similar to the fossil species of the same genus above mentioned.

The lecturer also mentioned several interesting facts about the ways of procuring them by dredging.

Next the family of corals were shewn to be very largely represented both in geological times and at the present day. They are the productions of myriads of coral polypes, or as they are sometimes erroneously called, Coral insects, which extract the lime necessary for their building from the sea-water. They occur either separate or as forming immense colonies which in time reach a size sufficient to form large rock masses, as we see in Barrier Reef of Australia. In geological times the same thing occurred, as similar reefs are found in limestone strata extending sometimes for miles.

Slides were exhibited of the ordinary corals which gave the best idea of the different kinds and forms, including the Brain Coral and others.

He next passed on to a much more important group of animals, since their remains are infinitely more numerous than those of the Crinoidea, namely the Foraminifera. The Foraminifera consist of a body protected by a calcareous shell or test and may be simple or repeat themselves indefinitely by budding. The test is often perforated with pores, the size of which varies in different species, and through these pores the body-substance gives out long and thread-like processes called "pseudopodia," which interlace to form a net work.

They occur in the oldest Palaeozoic rocks, and continue to be represented in both salt and fresh water deposits up to the present time, when they are found in vast quantities on the sea-bottom in places as in the Atlantic. The genera which represent this group are very numerous and a word or two about the principal ones will not be out of place. The genus *Discorbina* is a Nautiloid Foramifer, so called from its resemblance to the Pearly Nautilus, and then the better known *Rotalia* so often found in the chalk or in flint is noticeable. If not quite the commonest of all, at least the one with which people are best acquainted, is that known as *Globigerina*, which existed in countless myriads in the oceans of the Cretaceous Period and exists in large numbers now. It consisted of an aggregation of nearly spherical chambers having coarsely porous walls like those of the Rotalia. By different dredging expeditions species have been taken in large quantities which are very similar to those found in the Chalk.

The genus next referred to was that of the Nummulites, so called because of their resemblance to a coin (nummus). These Foraminifera attain a size of as much as 3 inches in circumference, and their structure is very complex. They reached their maximum development in the Middle Eocene Period, and the nummulitic Limestone of that age plays a more conspicuous part in solid framework of the earth's surface than any other Tertiary group. It often attains a thickness of thousands of feet, and extends from the Alps to the Carpathians, and occurs in the Pyrennees, the North of Africa, Persia, India and other places. Before leaving the subject of Foraminifera, the lecturer mentioned the Eozoon Canadense, the oldest known fossil, which was found in the lower Laurentian rocks of Canada. This fossil consists of a calcareous skeleton now filled by infiltrations of serpentine and other minerals which are found occupying all the spaces formerly filled by the sarcode or animal substance of the organism, the chambers thus filled being connected by tubes. This ended the Foraminifera.

It was thus shewn that limestone is composed of the calcareous remains and skeletons of animals who have died in the sea, and that their remains have then collected till they have formed beds of limestone many thousands of feet thick. Hence it is evident

that where limestone occurs forming dry land, that place must have been once, it may be countless centuries ago, many fathoms deep in some ocean where the animals whose remains now form the limestone lived and died, each one adding his little contribution to the deposit which in time, by the number of contributors, assumed the vast proportions it now possesses. Indeed it is probable, and in very many cases it is certain that the deposit was of much greater thickness and extent than now. For whence are drawn the supplies of Carbonate of lime in support of the myriads of marine inhabitants which need it for their shells and skeletons? Is it not mainly from the calcareous rocks which are dissolved away by the action of rain-water? And not only calcareous rocks suffer by this perpetual erosion which goes on, but all rocks are subjected to it; and though some resist for a longer time than others still in time they too are worn away, and the detritus is swept away to aid in forming deposits elsewhere. Thus it is that most hills are carved out and valleys formed, and these hills are in their turn slowly but surely attacked and eaten away, so that every landscape is perpetually changing more or less rapidly according to the composition of the rocks forming it. "Everlasting" is an epithet frequently applied to hills and mountains, for we cannot fully comprehend the fact that in spite of their apparent durability, their term of existence is definite, and though the composition of the rocks may lengthen or shorten that term it will all the same come to an end.

At the conclusion of the lecture a vote of thanks to Mr. Carpenter, proposed by the Rev. A. Carr was carried unanimously.

Saturday, June 4th.

Hon. E. Lyttelton read a paper on "Some Statues in Rome."

The lecture opened with a brief description of Rome as it first strikes the visitor, and the reasons for selecting the statues of the city for a subject.

Then followed an account of the process by which a marble statue is completed, consisting of three stages, the clay model, the plaster cast, and the finished statue: and an enquiry how far the ancient Greeks employed similar means. This suggested a *resumé* of the history of statuary, from its infancy in Greece: the wooden forest images, and their earliest decorations: the arms, and their copper sheathing: followed by the story of Butades' daughter, and the invention of clay-modelling, and that of bronze casting, by Theodorus of Samos. The latter

portion of the lecture consisted of a discussion of the famous Laocoon, preference being given to the theory that it was made at Rhodes about 150 B.C., and concluded with remarks on the Discobolus and the so-called "Good and Evil."

A vote of thanks, proposed by The Master, was carried unanimously.

Saturday, July 2nd.

T. L. Mackesy read a paper on the "Architecture of some Churches."

Of the Architectural Styles, the so-called Saxon style is disputed; the churches supposed to belong to it are mostly in the East of England, in retired districts: the style is like the Norman, but ruder. Edward the Confessor introduced the Norman work, which however was not brought to its perfection till after the Conquest. The round-headed arches, heavy pillars, zigzag ornaments, and moulding in orders, distinguish this style. Next came the Early English, First Pointed, or Lancet Style, lasting about 117 years (1190—1307); Salisbury and Lincoln Cathedrals belong to this date, and the spire of Christ Church, Oxford, (the oldest spire in the Country). The decorated period followed, for rather less than a century, distinguished by its beautiful window tracery and a great increase in ornament, whence it took its name: but in this point it was far surpassed by the last, or perpendicular style when taste had to a certain extent degenerated; the window tracery in elegant patterns being replaced by straight upright lines: while square heads were combined with pointed arches. Yet there are some splendid buildings of this date; notably much of Winchester Cathedral, and the three great Chapels, Henry VII's., S. George's, Windsor, and King's College, Cambridge.

Slides of many of these buildings were exhibited.

After the lecture, the Rev. P. H. Kempthorne proposed a vote of thanks.

Saturday, July 16th.

H. G. Lyons read his successful essay for the Pender Prize, entitled "A sketch of the rocks of Dublin."

After a short description of the country round Dublin within a radius of about 12 miles, the lecturer proceeded to take each formation separately and to discuss it, referring to its importance

commercially and scientifically, the nature of its fossil remains, and the extent of its development in this district.

The Cambrian rocks of Bray Head were first considered as being the oldest rocks of sedimentary origin, which occur round Dublin, and among the oldest in Ireland. The fossil remains in these strata are very few in number consisting of worm tracks and burrows of the genera *Arenicolites*, and *Histioderma*, and numerous specimens of the fossils *Oldhamia antiqua*, and *radiata*. The nature of these latter was discussed, for it is a disputed point whether they are the remains of fucoids, or the result of great pressure exerted on the rocks by superincumbent strata and other causes. The rocks of Howth Head and Ireland's Eye were also mentioned as being of this age.

Lower Silurian strata of the Bala and Caradoc age were next mentioned, which are represented by black slates, shales, and limestone. The limestone is very fossiliferous and contains numerous kinds of Brachiopoda, Crustacea, and Actinozoa, which may be obtained from a coast section some miles north of Dublin. Fossiliferous limestone of this age occurs also on the island of Lambay, and unfossiliferous slates near Skerries.

South of Dublin the granite has come in contact with these Lower Silurian slates and for a distance of nearly a mile from the granite, the slates have become a perfect Mica Schist with layers containing stellated crystals of Staurolite and some resembling Chiastolite, where it touches the granite. Some very interesting sections of this intrusive granite are to be got there. The Old Red Sandstone is only represented by beds of Conglomerate of no great thickness. The Carboniferous series, which was next discussed, is by far the most developed of all the rocks in the neighbourhood of Dublin. Parts of it are very fossiliferous while in other parts organic remains are scarce and ill-preserved. The lowest division, the Lower Limestone Shale, occurs of no great thickness, but its dark grey beds contain large numbers of Crinoidea, with specimens of Fenestellæ and Spiriferæ.

The Lower Limestone at Malahide contains most fossils, which are found imbedded in a dark and in some cases an earthy limestone which forms the coastline for a short way north of Dub in. The fossils from it represent the Genera *Productus*, *Spirifer*, *Rhynchonella*, *Strophomena*, *Euomphalus*, *Crinoidea*, and especially the Coral *Litho dendron junceum*, which occurs in large quantities at Malahide, specimens upwards of two feet across not being uncommon.

The next division is that called the "Calp," which is an earthy limestone and only sparingly fossiliferous. It covers a larger area in this district than other rocks, and is largely quarried for building and road-mending, though it is ill-suited for the latter use by reason of its softness, It is also used for carving, and

architectural ornament, and the tracery, etc., of St. Patrick's Cathedral is made of it. Lime is also obtained from it but even that is of an inferior quality.

The Upper Limestone Shale occurs in one or two places and contains *Aviculopectens*, *Goniatites* and other similar fossils. This is ths uppermost of the Carboniferous rocks, and no others occur till we come to the Drift which is very widely spread over this district; and after it in recent geological times were formed the "Esker Ridges" and "raised beaches," which also occur in this district. Granite was the next rock described which occupies a large area to the south of Dublin, and forms several hills of no great height. The rock itself is not of a very good quality, as it contains a large quantity of felspar which is very liable to weathering. It is quarried in large quantities however for building of all kinds, and the breakwaters of Kingston Harbour took six millions of tons of it.

In the granite, veins and dykes occur of another rock which is composed of the same materials as granite, though the mica sometimes becomes evanescent, but is much finer grained. This is Felsite or Eurite which from being finer grained is able to resist wear and weathering more effectually. It does not however occur in dykes of any great size, so that no blocks suitable for building can be obtained from it.

Trappean rocks are also represented, but they do not cover any great area and only occur as ashes, etc., at Portraine, north of Dublin, and as basalts at the hill called Slievenabawnoge to the south and at Howth. The last rock described was porphyry which occurs in considerable variety at Portraine, as many as four different kinds being described, however a light green rock with dark green crystals predominates.

At the conclusion of the paper The Rev. A. Carr expressed the pleasure with which he had listened to the Essay, and paid a tribute to the memory of Mr. Pender, giving a short account of his connection with the Society from its foundation and shewing the interest he had always taken in its welfare. Mr. Carr also alluded to the promise shewn by Mr. Pender during his short life of a brilliant future.

The President announced the following donations: a packet of geological pamphlets from Professors Prestwich and Rupert Jones, and the Report of the Smithsonian Institution. The thanks of the Society were returned for the same.

Saturday, October 1st.

D. N. Pollock gave a lecture upon "Volcanoes and Volcanic Energy."

The lecturer began by sketching the progress rapidly from ancient up to the present time of scientific and principally geological investigation. Starting from the theories of Xanthus and Strabo, he traced it through the pages of Pliny, the Arabian, and the later Italian, German, and English legends of Science and ending with the very remarkable researches of the Geological Society of London. Having thus slightly sketched the history of the subject, he proceeded to give some account of the origin of volcanic vents on the earth's crust, caused by the penetrating of the ocean water through fissures into the heated interior of the earth. Some account then was given of the major and minor cones of Etna leading to discussion on the subject of lateral cones and the mode of their formation. The process of truncation or falling in of great cones was touched on, and the volcanoes in the island of Java given as instances.

The lecturer then proceeded to give some methods of ascertaining the age of volcanic cones, and the periods of inaction. He then noticed some of the theories which had been advanced to account for the causes of volcanic eruptions.

The theory was discussed of volcanic force having been more terrific in past than in present time. Earthquakes then followed at the bottom of the sea, and mud volcanoes. The lecturer then gave some of the principal constituents of lava: and some facts regarding eruptions in Europe. He ended by briefly sketching the volcanic ranges of Europe.

At the conclusion of the lecture a vote of thanks was proposed by the Rev. J. H. D. Matthews.

Saturday, October 15th.

Capt. C. Cooper-King, F.G.S., gave a lecture on "Military Arms."

The lecturer traced the different kinds of weapons now in use, from their sources and primitive forms to their present shapes, accounting for their variations, and reading extracts from various authors which threw light on their forms and uses. On the table were a number of swords and knives, which he treated chronologically, shewing us first the sharp flints and stone knives, then the short Greek and Roman swords, then the heavy

trenchant blades, with the open hilts, of the days when complete suits of armour were worn; next the lighter swords of the nature of rapiers, for thrusting rather than cutting, and lastly, the partial return to cutting, but in combination with the thrust. After swords, he explained to us the like processes and changes in the shapes of spears and pikes, and also glanced briefly at firearms, exhibiting several specimens of each, among which we chiefly noticed the French chassepot and the partisan, while of the other weapons, perhaps the most admired were a short but deadly looking mace and a Spanish rapier.

After the lecture, which, was highly appreciated, Mr. Kempthorne proposed a vote of thanks and the meeting were invited to examine Capt. Cooper-King's valuable assortment of weapons, which they did with much gratification and interest. Present, 102.

Saturday, October 29th.

The Rev. W. D. Fenning lectured on "Greek Statuary." After comparing Assyrian and Egyptian with Greek sculpture, and demonstrating the bold though rough fashion of the forms with the life-likeness and polish of the last, the rest of the lecture consisted chiefly of description of the numerous famous works of art (illustrated partly in the magic-lantern and partly by photographs). Of this latter part it was unfortunately found impossible to take an abstract.

At the conclusion of the Lecture a vote of thanks was proposed by the Rev. J. H. D. Matthews.

Present, 82.

Friday, December 9th.

H. G. Lyons read a paper entitled "A month's tour in the Tyrol."

After a short list of the places visited, the lecturer began his account of the tour by the start from Queenborough whence he travelled viâ Flushing, Cologne and Maintz to Munich, briefly noticing the principal noteworthy features of the districts passed through. At Munich there was an unavoidable delay of three days which were fully employed in seeing as much as possible of Munich and its surroundings. The first day was spent in seeing the Glyptothek, Basilica, Residenz, and other public buildings, and in the afternoon in visiting the Shooting Fête which was then being held at this town. The Hofbraühaus, or Court Brewery, was also visited where a great deal of the celebrated Bavarian beer is brewed, and also consumed.

The second day was spent in visiting the Starnberg lake about 10 miles from Munich, and which is one of the principal places whither the people of Munich resort for holiday making. It has none of surroundings of mountain lakes and lake scenery since it is situated on the Bavarian plain and the Alps are only seen in the distance; still it is very pretty with its green banks and villas.

On the third day in Munich the Museums were visited and in the evening the Opera House where the celebrated Opera of Wagner, "Tannhaüser" was performed. This was the second opera seen at Munich this time, the first being "Raimondin" which was performed on the evening of the first day spent in Munich.

After this delay the real start for the mountains was made and the first day the little village of Fall in the extreme South of Bavaria was reached, where a night was spent in rather rough quarters, which were left early the next morning to walk to the lake of Achensee, where a stop was to be made for a few days. The walk was through a small but very beautiful and picturesque valley called the Achenthal, which finally opened into the lake of Achensee itself, which appears to have made very favourable impressions; for the description of it represented it as being all that could be desired. Two of the mountains which form the chain in the bosom of which this lake lies were ascended and the views from the summits were in each case very fine: indeed the visit to Achensee seems to have been in every way highly satisfactory, and the place itself to have possessed no inconsiderable attractions of its own since the stay which was originally to have been one of only three days was prolonged into one of a week; and so far from having in this time exhausted the attractions of this place, a second visit was paid there on the return journey, when we are assured that, "Achensee was as pleasant as ever and the time there passed only too quickly."

Innsbruck was the next place which was visited, and there the Churches, and Museums, the collections of ironwork, wood-carving and paintings proved to be very interesting. While speaking of this place, a short account of the life of that famous Tyrolese patriot, the bold peasant-general Andreas Hofer, who in his native mountain defiles and fastnesses gained several victories over French and Bavarian troops, but was at last taken prisoner and shot.

From Innsbruck the route lay in a southerly direction over the Brenner Pass, where the railway exhibits some very skilful engineering in having advantage of all the curves of the valley in order to lessen the steepness of the gradient as much as possible, in cases where there is a difference of 500 feet between two neighbouring stations, as occurs between those of Gossensass and Schelleberg.

A day was spent at the village of Gossensass on the southern side of the Brenner Pass, and here an ascent of one of the mountains there, the Hühner Spiel, was made, whose summit commanded a most extensive view. It was still early when the top was reached by the foremost of the party, and the horizon was still clear, thus affording a view which the rest of the party who came up later missed as mists and clouds soon began to obscure it. More than 15 large glaciers could be seen at one time, and many snow peaks and snow fields could then be distinctly seen which had been vaguely discerned before from the summit of one of the mountains at Achensee. Very early the following morning Gossensass was left *en route* for the little village of Heiligenblut in the province of Kaernten.

The military post of Frankensfeste was soon reached and from there the railway ran through the Pasterthal, which skirts the northern margin of the Dolomite Country, and is well known for its beauty, being walled in by the lofty, sharply defined peaks of the dolomite mountains, most of which, as for instance does the lofty Drei Herrn Stein, rise to form sharply pointed peaks with steep bare sides which in many cases do not even afford any space level enough for snow to lie upon, and the vegetation is very scanty consisting chiefly of coarse grass, with Edelweiss and other similar mountain plants.

At Lientz the valley suddenly widens into a broad level expanse with a soil consisting of a fine silt, which points to this space having been formerly occupied, perhaps at a comparatively recent period, by a lake which has been drained or filled up by the silt brought into it by the streams which supplied it with water.

A walk over a mountain followed, and the little village of Winklern was reached and after a drive of four hours the little hamlet of Heiligenblut, at the northern end of the Moerthal under the Gross Glockner, a mountain more than 13000 feet high.

Between this village and the Gross Glockner itself rose an intervening mountain, and between these two mountains lay the Glockner glacier. The glacier itself is in appearance similar to other glaciers, the same slowly moving mass of ice, blue in colour in the deepest crevasses, with its surface strewn more or less thickly with gravel, sand and boulders of all sizes, which go to increase the heap of marine matter at the foot of the glacier, and to supply the place of that which had been swept away by the turbid torrent which rushed out from under the ice, and flowed down the valley. The scenery of this valley was especially grand, and the magnificent waterfalls from the cliffs which bounded it, added in no small degree to the beauty of it, as a projecting ridge of serpentine would cause the water to make a leap of 200 or 300 feet down into the valley below.

The furthest limit of the journey had now been reached, and the return journey was commenced which led back again over the same ground as far as Lientz, and from there again through the Pasterthal to the village of Toblach which is situated at the head of the Ampezzothal, and about 12 miles from Cortina, at the northern margin of the Dolomite Country. The scenery of this part of the Dolomite Country is well known for its beauty and the southern part of the Ampezzothal is much visited, for the view of the Monte Cristallo with its snow-clad peak reflected in the waters of the lake below is exceptionally fine. Here an ascent of one of the mountains, called the Durren Stein, was made, which afforded a very difficult climb, and a view from the summit which fully compensated for it.

Gossensass and Innsbruck were passed through again *en route* for Achensee, which seemed to have lost none of the attractions it had on the first occasion, where another stay of three days was made. Munich was again visited for a night, and then Nuremberg, which old German town was full of interest and supplied more than could be seen in the time available.

The journey by steamer down the Rhine from Maintz to Cologne, though there was not very much to be written about it, was well illustrated by a series of slides descriptive of all the principal places on that river.

Cologne Cathedral was of course visited, which for beauty and the elegancy of its stone carving ranks among the first in Europe; and slides were exhibited of the interior and exterior of this celebrated edifice.

The church of St. Ursula was also mentioned, and the legend connected with it noticed, as well as the churches of the Holy Apostles, and St. Peter where the celebrated painting by Rubens of St. Peter's crucifixion is. The journey from Cologne to Queenborough was made direct, and thus ended what appears to have been an excessively pleasant months's tour.

A vote of thanks to the lecturer was proposed by the President and carried unanimously.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Tuesday, February 1st.

At a P.B.M., E. W. Besley, E. W. Monkhouse, R. T. Turnbull, were elected Associates. P. G. Gates resigned his office of Treasurer, and T. Harrison succeeded—a vote of thanks was passed to the former for his services. E. G. King was elected Entomological Album Keeper. R. R. Ottley and T. L. Mackesy were elected Members of Committee for the Term.

In Committee afterwards, E. A. Mitchell-Innes was elected a Member on the ordinary list, and T. Harrison, E. G. King, on the special qualification list.

Thursday, February 17th.

At a P.B.M., M. H. Milner, H. E. Stockdale, J. W. Cave, G. W. Fraser, E. P. Simpson, A. C. M. Waterfield, R. N. Daniel, A. Waldy, J. D. Gouldsmith, E. S. Campbell, were proposed for Associates. The Secretary moved, that the VIth be no longer allowed to attend meetings without tickets: this being a motion to cancel an existing rule, required notice to be given, and was accordingly reserved for decision at the next meeting.

Saturday, February 19th.

At a P.B.M., the Associates proposed at the previous meeting were elected: and the following proposed, J. G. Carew-Gibson, C. T. Lavie, G. C. Brownell, W. T. Power, R. T. Laurence, G. F. H. Simmons, J. H. W. Guise, T. C. Ross, W. E. Capron, R. Macandrew, C. Bateson, N. C. Macleod, F. G. Mackenzie, T. E. Crawhall, C. H. Cayley, E. G Verschoyle, G. P. T. Feilding, J. C. Kirk, C. O. Shipley, G. A. Cardew, J. W. Evans.

On the motion of D. N. Pollock (pursuant to notice) the words "VIth Form" were omitted from Rule 21 (Report for 1879) and "Prefects" substituted.

Saturday, March 5th.

At a P.B.M., A. L. Harrison gave notice of a motion that the number of Associates be limited to 60; but that additional Associates be elected, if possessing special qualifications.

Saturday, March 19th.

At a P.B.M., the President proposed, that the number 70 be substituted for 60 in the motion of which notice had been given. The amendment was accepted and the motion carried unanimously. To fill the 10 vacancies C. T. Lavie, G. F. H. Simmons, G. C. Brownell, W. T. Power, N. C. Macleod, C. Bateson, F. G. Mackenzie, J. H. W. Guise, E. G. Verschoyle, G. P. T. Feilding, were elected—and it was agreed that those now proposed, and awaiting election, should take precedence of those, who might subsequently be proposed.

Saturday, May 17th.

At a P.B.M. R. T. R. Laurence, C. H. Cayley, R. Macandrew, W. E. Capron, J. W. Evans, T. E. Crawhall, J. G. Carew-Gibson, C. O. Shipley, J. C. Kirk were elected Associates. T. L. Mackesy and N. Walter were elected on the Committee for the Term. Some Associates were proposed.

J. L. Bevir, Esq., offered a prize to be given at the end of this term, for the best collection of Coleoptera and Dragon Flies. G. Sillem and T. L. Mackesy were elected judges for the Pender Prize.

Saturday, June 4th.

At a P.B.M. Hon. E. Lyttelton was elected an Honorary Member, and the following were elected Associates, G. A. Cardew, J. C. Inglis, P. Robertson-Ross, S. A. Schiff, W. H. Gorringe.

D. N. Pollock resigned his office of Secretary, and T. Harrison that of Treasurer. Votes of thanks were passed to them for their services, and R. R. Ottley was elected Secretary, the latter post remaining unfilled.

Saturday, July 2nd.

At a P.B.M. A. G. Hunter-Weston was elected Treasurer.

Saturday, July 16th.

At a P.B.M. R. A. Godwin-Austen resigned the Geological Album and H. G. Lyons was elected to succeed him.

The following Associates were proposed, V. H. Bowring, W. B. Staunton, L. F. Green-Wilkinson, R. G. Coke, G. H. Davidson, G. Sandys-Lumsdaine, E. R. Benson, H. H. Noel.

Monday, September 26th.

At a P.B.M. the Associates proposed on July 16 were elected. H. T. Brooking resigned the Meteorological Album, a vote of hanks was passed to him for his services, and D. H. Barker was elected to succeed him. D. N. Pollock and T. Harrison were elected on the Committee for tbe term.

In Committee afterwards the following were elected Members, R. B. Joyce, A. G. Hunter-Weston and H. G. Lyons.

Tuesday, October 11th.

At a P.B.M. H. F. Newall, Esq., and E. A. Upcott, Esq., were elected Honorary Members. M. Dale, R. Peel, were elected Associates.

Friday, December 9th.

A few Associates were proposed.

R. R. OTTLEY, *Secretary.*

EXCURSION.

On May 26, Ascension Day, an excursion was made to Silchester by some members of the Society, under the guidance of Mr. Allen (the President being unfortunately engaged elsewhere). The drive was less enjoyable than it might have been, as the rain was very heavy for part of the way, and lunch was seriously interfered with. However, at Silchester it held up, and the party were able to inspect the remains of the town, and the small museum of curiosities. Then we walked to Mortimer, and after tea there, drove home in finer weather than we had for our outward trip.

PRIZES.

A prize of the value of £5 is given annually by Mrs. Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition.

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two ordinary Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President.

In order to prevent disappointment,competitors are recommended to mention the subjects chosen, to the President before writing their essays.

Preference will be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

6. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

7. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1881 was awarded to H. G. Lyons for an essay bearing the title "A sketch of the rocks of Dublin."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The winners of these prizes for 1881 were

(1) E. G. King, W. H. Gorringe, æq. (2) G. Elam.

J. L. Bevir, Esq. offered a prize for the best collection of Coleoptera and Dragon Flies.

As no satisfactory collections of Coleoptera were sent in, the prize was awarded to G. Elam for the best collection of Dragon Flies.

ENTOMOLOGICAL REPORT.

The following specimens are new to the list of Lepidoptera and have not been taken or recorded before.

FAMILIA.—PAPILIONIDÆ.

SUB FAM.—HESPERIDÆ.

Hesperia Sylvanus ..	..Large Skipper	..June 20	..J.L.B.

FAMILIA.—GEOMETRÆ.

GENUS II.—ENNOMIDÆ.

Pericallia Syringaria	..Lilac Beauty	..June 10	..E.G.K.

GENUS III.—AMPHYDASIDÆ.

Amphydasis prodromaria	..Oak Beauty ..	..April 5	..G.A.B.

GENUS IV.—BOARMIDÆ.

Tephrosia punctulata	..The Gray Birch	..May 9	..J.L.B.

GENUS XIII.—LIGIDÆ.

Hybernia leucophearia	..The Spring Usher	..Mar. 5	..G.A.B.

NOCTUÆ.

GENUS VI.—CARADRINIDÆ.

Caradrina blanda ..	..The Rustic ..	..July 1	..H.A.B.

GENUS VIII.—ORTHOSIDÆ.

Noctua Rhomboidea	..The Square Spotted Clay..	July 17	..J.W.C.

GENUS X.—HADENIDÆ.

Hadena glauca ..	..The Glaucous Shears.	..April 10	..J.L.B.
Hadena dentina	..The Shears.. ..	..July 1	..H.A.B.

Finders:
- J.L.B. = J. L. Bevir, Esq.
- H.A.B. = H. A. Bull, Esq.
- E.G.K. = E. G. King.
- J.W.C. = J. W. Cave.
- G.A.B. = G. A. Burton.

E. G. KING,

Entomological Secretary.

ARACHNIDA.

Prizes were offered during the spring and summer for good work in collecting spiders. Collectors were numerous, and some thousands of specimens were obtained. The Rev. O. Pickard Cambridge has most kindly again helped us by naming our specimens, and thus we are able to largely augment the collection of spiders which we began to form last year.

The prizes were awarded to C. P. Aldridge, R. C. Wellesley, and F. S. Goldingham.

Appended is a list of the spiders that have hitherto been found at Wellington College, classed and named on the system adopted in Mr. Cambridge's "Spiders of Dorset." Those marked **a** have been noticed during the past year; species not previously recorded are distinguished by an asterisk.

THERAPHOSIDES.

DYSDERIDES.

DRASSIDES.

Gnaphosa lugubris **a***
Prosthesima Petiverii
Drassus Blackwallii **a***
" *troglodytes* **a***
" *pubescens* **a***
Clubiona terrestris **a**
" *pallidula*
" *brevipes* **a**
Chiracanthium carnifex
" *Pennyi*
Anyphaena accentuata **a***
Agroeca brunnea **a**
" *proxima* **a**
Hecaerge maculata **a**

ERESIDES.

DICTYNIDES.

Dictyna arundinacea **a**
" *latens*
" *variabilis*
Lethia humilis
Amaurobius similis **a**
" *ferox* **a***

AGELENIDES.

Tegenaria atrica **a**
" *Derhamii* **a**
Agelena labyrinthica **a**

SCYTODIDES.

PHOLCIDES.

THERIDIIDES.

Episinus truncatus **a**
Theridion formosum
,, *riparium* **a***
,, *sisyphium*
,, *denticulatum* **a**
,, *varians* **a**
,, *tinctum* **a**
,, *simile* **a**
,, *pulchellum* **a**
,, *bimaculatum*
,, *pallens*
Phyllonethis lineata **a**
Steatoda bipunctata **a**
Euryopis inornata
Neriene atra **a**
,, *fusca* **a***
,, *bituberculata*
Walcknaera pumila
,, *altifrons* **a**
Pachygnatha Degeerii **a**
,, *Clerkii* **a**
Linyphia minuta
,, *tenebricola* **a**
,, *obscura*
,, *socialis*
,, *dorsalis*
,, *circumspecta* **a**
,, *clathrata* **a**
,, *montana* **a**
,, *triangularis* **a**
,, *pusilla*
Ero thoracica **a**
,, *tuberculata*

EPEIRIDES.

Meta segmentata **a***
,, *Merianae*
Tetragnatha extensa **a**
Cyclosa conica
Zilla x-notata **a**
,, *atrica*
Epeira cucurbitina **a**
,, *adianta*
,, *diademata* **a**
,, *agalene*
,, *cornuta*
,, *quadrata* **a**
,, *umbratica* **a**
,, *acalypha* **a**
,, *sollers*

ULOBORIDES.

Uloborus Walckenaerius

THOMISIDES.

Thomisus onustus **a**
Misumena vatia **a**
Xysticus cristatus **a**
,, *viaticus*
,, *pini*
,, *lanio* **a**
,, *sabulosus* **a***
Philodromus margaritatus
,, *dispar* **a**
,, *aureolus* **a**
,, *elegans*
Tibellus oblongus **a**
Micrommata virescens

LYCOSIDES.

Ocyale mirabilis **a**
Dolomedes fimbriatus **a**
Pirata piraticus
Trochosa ruricola
,, *terricola*
Tarentula pulverulenta **a**
,, *andrenivora* **a**
Lycosa amentata **a**
,, *annulata* **a***
,, *lugubris* **a***
,, *pullata* **a**
,, *riparia* **a**
,, *nigriceps* **a**
,, *herbigrada* **a**
,, *palustris* **a**
,, *monticola* **a***

OXYOPIDES.

SALTICIDES.

Epiblemum scenicum **a**
,, *cingulatum*
Heliophanus cupreus
Marpessa muscosa **a**
Attus pubescens **a***
Hasarius falcatus

The total number of species hitherto observed here is 107, of which 14 were observed for the first time during 1881.

METEOROLOGICAL REPORT.

The following records of observations do not, as will be seen, pretend to any very great degree of accurrcy.

It is hoped that the Society may gradually be able to acquire the possession of more perfect instruments and that the observations may then become of permanent value.

The records for May and July have unfortunately been lost.

JANUARY, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	30·30	31	32	31		28	67	
2	30.30	40	40	40		28	60	
3	30·30	39	40	39		37	47	
4	30·20	33	31	27·4		32	53	
5	30·20	39	38	36·5		30	44	
6	30·30	35	34	32·5		35	68	
7	30·50	28	28	28		26	72	
8	30·45	29	30	29		27	61	
9	30·30	36	33	28·5		29	45	
10	30·00	30	30	30		30	51	
11	29·75	29	30	29		29	57	
12	29·80	28	28	28		25	50	
13	30·10	26	28	26	No record.	16	86	
14	29·70	30	25	7		15	42	
15	29·70	24	23	16·7		15	50	
16	29·70					9	57	
17	29·70	28	30	28		12	67	
18	29·20	28	28	28		9	52	
19	29·10	25	26	25		25	36	
20	29·70	18	18	18		9	37	
21	30·05	20	21	20		10	68	
22	30·10	14	18	14		9	76	
23	30·10	29	30	29		16	64	
24	30.20	19	21	19		10	52	
25	29·90	20	21	20		17	44	
26	29·60	21	23	21		16	54	
27	29·25	35	36	35	43	21	38	
28	29·05	34	35	34	44	34	63	·8
29	28.95	43	43	43	44	34	56	·4
30	29·10	48	48	48	47	39	54	·1
31	29·45	38	38	38	47	33	55	·1
	Average 29·84							Total 1·4

FEBRUARY, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	29·76	36	36	36	52	33	97	
2	30·21	40	40	40	42	32	47	·2
3	30·15	47	47	47	51	39	60	·1
4	29·90	46	46	46	53	45	62	
5	30·20	41	41	41	51	40	70	
6	29·80	31	31	31	44	30	65	
7	29·91	34	34	34	44	21	87	·5
8	29·20	47	47	47	49	32	51	
9	29·71	43	43	43	50	41	88	·4
10	29·04	48	48	48	50	40	61	
11	28·99	41	41	41	50	38	92	
12	29·96	32	32	32	40	28	65	
13	29·96	34	34	34	41	24	84	
14	29·71	38	38	38	41	33	53	·3
15	29·71	39	39	39	40	37	45	·1
16	29·86	33	33	33	47	26	64	
17	29·86	37	37	37	46	32	60	
18	29·96	42	42	42	44	33	54	
19	30·06	38	38	38	49	37	67	
20	30·08	34	34	34	49	39	58	
21	30·17	33	33	33	40	34	46	
22	30·07	32	32	32	35	24	47	
23	30·07	32	32	32	42	31	46	.2
24	30·22	32	32	32	35	32	44	
25	30·11	34	34	34	42	33	81	
26	29·76	33	34	33	38	24	44	
27	29·76	34	34	34	52	27	89	
28	29·71	33	33	33	36	18	60	
	Average 29·85							Total 1·8

MARCH, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	29·96	30	30	30	34	19	64	
2	30·16	34	34	34	46	25	99	
3	30·06	36	36	36	44	31	89	.1
4	29·50	39	39	39	43	35	47	·5
5	29·30	49	49	49	51	39	60	·4
6	29·40	48	48	48	58	45	88	·1
7	29·30	52	52	52	58	49	100	·2
8	29·70	41	41	41	57	43	76	·1
9	29·90	49	49	49	49	39	91	
10	30·05	51	51	50	53	48	70	
11	30·05	49	49	49	58	46	95	
12	29·96	49	49	49	58	40	111	
13	29·91	39	39	39	59	40	92	
14	29.89	41	41	41	52	39	73	
15	30·11	38	38	38	55	27	101	
16	30·31	39	39	39	53	27	83	
17	30·46	41	41	41	62	30	105	
18	30·22	45	45	45	60	40	110	·3
19	29·86	40	40	40	56	35	108	
20	29·70	39	39	39	56	38	104	
21	29·91	34	34	34	48	27	100	·1
22	29·90	38	38	38	52	30	102	·05
23	29·86	41	41	41	48	25	101	
24	29·30	45	45	45	48	38	85	
25	29·40	38	38	38	51	32	93	
26	29·65	37	37	37	46	26	95	
27	29·81	35	35	35	46	24	98	
28	29·94	34	34	34	48	25	96	
29	29·71	36	36	36	50	23	99	
30	29·96	34	34	34	54	20	104	
31	30·06	37	37	37	46	25	92	
	Average 29·83							Total 1·85

APRIL, 1881.

Date	Barom. Reduced.	Temperature.						Rain in Inches
		Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	
1	29·81	37	37	37	48	30	102	
2	29·76	39	39	39	57	35	103	
3	29·93	35	35	35	51	31	99	
4	29·90	35	35	35	51	28	100	
5	29·70	37	37	37	49	32	100	
6	29·70	39	39	39	56	33	105	
7	29·96	38	38	38	55	30	103	
8	30·01	35	35	35	52	28	101	
9	30·06	39	39	39	53	36	98	
10	39-98	42	42	42	58	26	117	
11	39·80	52	52	52	63	38	96	
12	29·85	51	51	51	62	44	98	
13	39·90	55	51	46	59	44	100	
14	29·79	55	54	53	61	43	118	
15	29·84	53	51	49	60	45	102	
16	29·89	46	43	39·7	62	40	112	
17	29·87	43	43	43	60	38	120	
18	29·81	36	34	31	56	34	109	
19	29·86	39	37	34	60	34	121	
20	29·76	35	34	32·5	54	26	97	
21	29·71	41	38	34·1	60	24	102	
22	30·06	42	38	32·8	57	22	110	
23	22.90	52	50	48	59	44	108	·1
24	30·00	47	45	42·8	58	39	113	
25	29·90	48	47	44·9	60	37	96	
26	30.15	46	46	46	59	35	112	
27	30·11	52	50	48	61	38	115	
28	30·06	57	52	48	57	36	98	
29	30·24	43	43	43	55	32	121	
30	29·85	47	45	42·8	59	46	95	
	Average 29·90							Total ·1

JUNE, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	30·31	62	61	60·2	78	46	136	
2	30·21	63	61	58·4	80	45	138	
3	30·21	63	62	61·2	81	48	135	
4	30·11	65	62	59·6	81	48	129	
5	29·69	59	57	55·4	80	50	131	·5
6	29·47	53	51	51	61	45	85	·5
7	29·65	44	44	44	60	38	112	·3
8	29·90	49	46	42·7	57	40	100	
9	29.90	48	45	42·7	57	32	118	·1
10	30·21	52	44	36	56	40	118	·2
11	30 00	51	47	43	62	45	118	
12	30·21	55	52	49	64	50	122	
13	30·20	56	52	48	70	52	131	
14	30·25	57	53	49·8	72	46	127	
15	30·00	58	53	49	72	50	121	
16	29·97	59	54	49	74	52	129	·1
17	29·90	59	54	49	71	54	101	·1
18	29·90	59	54	49	74	55	111	·3
19	29·84	57	53	49·8	72	52	107	
20	29·79	58	53	49	70	50	104	·1
21	29·59	61	57	53·8	71	55	120	·1
22	29·69	60	55	51	72	54	130	
23	30·10	62	56	51·2	71	56	121	
24	30·25	61	56	52	72	40	125	
25	30·10	62	54	47·6	37	45	122	
26	30·20	61	55	50·2	71	49	101	
27	30.00	63	58	54	70	52	121	
28	30·20	60	56	53·8	65	45	102	
29								
30								
	Average 29.99							Total 2·3

AUGUST, 1881.

Date	Barom. Reduced.	Temperature.					Solar Radiation.	Rain in Inches
		Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.		
1	29·50	68	68	68	64	63		·2
2	29·80	63	60	57·6	64	59		
3	29·95	58	57	56·2	64	58		
4	30·25	62	60	59·4	63	62		
5	29·80	64	64	64	70	48		
6	29·85	62	57	53	65	50		
7	29·60	65	61	57·8	67	52		·7
8	29·30	55	52	49	66	57		
9	29·40	55	53	53·4	64	54		
10	29·55	58	55	52·6	64	53		
11	29·65	59	54	49	65	45		·15
12	29·55	52	52	52	65	50		1·0
13	29·40	58	57	49	63	45		1·0
14	29·55	54	57	48	61	52		
15	29·60	56	52	48	63	47		
16	29·40	59	58	57·2	61	54	Not taken.	·05
17	29·20	58	53	49	68	52		·35
18	29·30	56	53	50·6	62	49		
19	29·30	54	54	54	63	50		
20	29·60	55	51	47	64	47		
21	29·50	57	55	53·4	66	49		·9
22	29·60	58	56	54·4	63	43		·1
23	29·45	61	58	55·4	65	53		·5
24	29·40	58	55	52·6	65	50		·1
25	29·50	57	56	55·2	63	48		·3
26	29·20	61	57	53·8	63	48		·2
27	29·40	63	54	46·2	64	47		
28	29.75	49	48	46·9	59	38		·15
29	29·75	57	56	55·2	59	48		·7
30	29·75	57	57	57	61	54		·15
31	29·80	50	47	44	64	48		
	Average 29·57							Total 6.55

SEPTEMBER, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Buld.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	29·90	51	47	43	63	48	84	
2	29·85	50	48	46	61	49	103	
3	29·75	53	51	49	60	51	101	
4	29·60	50	50	50	60	41	96	
5	29·45	54	54	54	62	46	104	
6	29·55	57	56	55·2	64	49	108	
7	29·60	56	56	56	63	50	106	
8	29·50	47	47	47	58	49	110	
9	29·70	50	49	48	61	54	112	
10	29·75	56	54	52·4	65	47	110	
11	29·65	55	54	53	62	51	114	
12	29·80	53	53	53	64	54	109	
13	29·75	45	45	45	63	55	113	
14	29·75	48	47	44·9	64	54	107	
15	29·80	57	54	49	64	45	122	
16	29·90	49	49	49	65	37	115	
17	29·50	47	47	47	66	42	112	·2
18	29·40	50	50	50	62	46	123	·15
19	22·50	60	59	58·2	64	55	110	
20	29·55	54	52	50	65	46	115	·2
21	29·15	61	60	59·2	57	50	108	·05
22	29·30	57	50	49	62	42	93	·25
23	29·65	54	54	54	61	50	70	
24	29·90	60	58	56·4	60	53	85	
25	29·80	61	58	55·4	65	54	120	
26	29·75	59	58	57·2	69	43	120	·15
27	29·85	52	52	52	65	45	117	·1
28	30·00	50	50	50	62	39	111	
29	30·05	43	43	43	64	35	117	
30	30·05	44	44	44	65	36	136	·2
	Average 29·69							Total 1·30

OCTOBER, 1881.

Date	Barom. Reduced.	Temperature.					Solar Radiation.	Rain in Inches
		Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.		
1	30·30	49	47	44·8	65	37	112	
2	30·15	48	46	44·8	66	34	129	
3	30·10	49	47	44·8	61	33		
4	30·15	49	45	40·6	60	36		
5	30·15	43	41	38·4	55	27		
6	30·20	43	43	43	50	28		
7	30·45	49	43	36·4	55	40		·3
8	30·10	47	46	44·9	53	43	102	·2
9	29·83	44	43	41·7	45	41	97	
10	30·02	45	43	40·4	48	37	69	
11	29·81	57	55	53·4	58	47	126	
12	29·86	53	49	45	63	42	101	
13	29·82	49	46	42·7	63	43	90	·4
14	29·05	55	50	45	58	48	88	
15	30·00	45	41	36·6	60	35	103	
16	30·33	37	31	22	50	26	97	·1
17	30·37	39	33	22	50	24	100	
18	30·25	45	42	38·1	55	30	102	
19	30·12	42	38	32·8	54	35	98	·3
20	30·13	45	41	36·6	50	37	91	.1
21	29·61	45	44	41·7	51	43	97	
22	29·44	48	46	44·8	54	42	65	1·0
23	29·38	55	53	53·4	54	47	54	·4
24	29·69	48	47	45·9	55	47	64	
25	29·75	43	40	36·1	47	36		
26	30·02	45	43	40·4	43	34	96	
27	30·17	40	39	37·5	51	34	91	·1
28	30·17	39	37	34	43	32	71	
29	30·09	36	34	31	40	35	91	
30	30·19	35	33	30	40	28	91	
31	30·17	25	23	10·4	36	20	85	
	Average 29·67							Total 2·9

NOVEMBER, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	29·78	38	36	33	42	25	92	
2	29·75	39	37	33	40	32	65	·1
3	29·71	40	40	40	47	32	87	·2
4	29·92	44	43	41·7	56	49	65	·1
5	29·97	56	54	52·4	52	53	65	·1
6	30·13	54	53	52	64	52	98	
7	30·22	50	49	48	60	39	102	
8	30·19	55	53	53	60	47	73	
9	30·09	50	48	46	58	48	65	
10	30·04	59	55	51·8	62	41	98	
11	30·24	55	53	51	62	48	70	·15
12	30·03	54	53	52	58	51	74	
13	30·38	55	53	51	69	51	92	
14	30·38	51	50	49	60	49	104	
15	30·03	47	45	42·8	59	43	62	
16	30·01	51	47	43	58	39	65	·25
17	29·73	47	45	42·8	59	40	95	
18	30.25	41	37	31·8	55	29	91	·05
19	30·22	49	47	44·8	52	35	87	
20	30·01	53	51	49	56	40	80	
21	2953	50	48	46	59	41	98	
22	2975	53	47	41	57	45	92	
23	29·84	49	47	44·8	57	37	74	
24	30·04	50	48	46	52	37	95	·5
25	29·72	53	52	51	55	43	75	
26	29·61	45	41	36·6	53	37	70	·5
27	29·01	49	45	40·6	55	43	85	·1
28	29·37	52	47	42	53	42	87	
29	22·95	36	35	33·5	53	31	83	·1
30	29·91	40	38	35·4	54	32	78	·3
	Average 29·90							Total 2·45

DECEMBER, 1881.

Date	Barom. Reduced.	Temperature. Dry Bulb.	Wet Bulb.	Dew Point.	Max.	Min.	Solar Radiation.	Rain in Inches
1	29·90	46	45	43·9	50	33	85	
2	30·24	48	47	43·8	53	33	83	
3	30·06	52	47	42	58	35	87	
4	31·17	44	42	39·4	55	34	83	·1
5	30·00	47	47	47	49	40	66	
6	30·29	43	43	43	47	32	78	
7	30·15	45	44	42.9	50	34	82	·6
8	29·92	49	47	44·8	53	32	86	
9	29·61	45	45	45	43	34	85	
10	29.76	36	34	31	42	30	54	
11	29·67	30	30	30	38	24	45	
12								
13								
14								·62
15	30·03	40	40	40	51	33·5	74·5	·36
16	29·87	41	41	41	42	37·5	42·5	·19
17	29·26	44	44	44	45·5	36	46	·50
18	29·23	37	37	37	40	36	41	
19	29·52	34	34	34	36	33	35	·30
20	28·95	39	37	34	41	34	39	·06
21	29·57	38	36	33	38·5	35	40·5	
22	29·85	26	26	26	32	25	34	
23	30·35	23	23	23	30	21	42	
24	30·46	31	31	31	34	20	40	
25	30·46	33	33	33	35	27	38	
26	30·59	44	42	39·4	45	33	43	
27	30·59	41	41	41	42	41	47	·2
28	30·44	40	40	40	40	38	46	
29	30·24	42	42	42	43	34	42	
30	29·99	41	40	38·7	42	38	42	
31	29·89	42	42	42	43	36	50	Total 2·93
	Average 29·24							

D. H. BARKER,

Meteorological Album Keeper.

ETHNOLOGICAL REPORT.

The following additions have been made to the Society's collection during the past year.

Presented by H. J. Faithfull, Lieut. 19th Punjab Infantry.

An Afghan Sword or Tulwar.

An Afghan Banner, taken 19th April, 1880, at Ahmed Khel, by Sir Donald Stewart's column.

Large Knife and Leather Ammunition Pouch, from the same battlefield.

Shoes used at Peshawur.

Egyptian Figures, a Scarabæus and a King from the Pyramids, presented by R. B. Webb.

Cray Fish (*Astacus Fluviatilis*) encrusted in Carbonate of Lime, from Auvergne, presented by S. Spencer Wells.

Fossil Shark's Teeth from the Miocene Formation of Malta, also Small Tooth of a Sea Cow, presented by G. P. T. Feilding.

Lead Bullet and Tobacco Pouch found at Bingley Moss, Yorkshire. These are relics of the Civil War (Fairfax's Campaigns in Yorkshire), presented by P. N. Salmond.

T. C. PAKENHAM,

Ethnological Album Keeper.

THIRTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1882.

" Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης."

'Επιστολὴ πρὸς 'Ρωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1883.

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WELLINGTON COLLEGE.
GEORGE BISHOP.

1883.

Contents.

PREFACE.

In offering our Report for 1882 we may congratulate the Society on the activity which has been displayed in some branches of its work, although we fear that in others there is little to record.

The improvement which we were able to note last year in the registration of the Meteorological observations has been fully maintained, and, by the help of a largely increased grant from the Master, the Society has been able gradually to acquire more perfect instruments. The observations have during term time been taken by the Album Keepers with great regularity, and, as will be seen from the Report, are now sent to the Meteorological Society.

An attempt was made during the year to observe the plants, birds and insects, named in the Meteorological Society's Phenological list. The observations were not commenced until rather late in the year, and as they were then undertaken by only a very limited number of Members it has not been thought worth while to publish the results. As this is a field in which a great deal of very useful work may be accomplished by the younger members of a Society like ours we shall hope to see many of them joining in the search, so that the record for 1883 may be as complete as possible. Lists of the phenomena, and of the times at which they may be expected to appear, will be found on the Society's boards, where may also be seen the particulars of several prizes which have been offered for the observations.

A good deal of interest has been shewn during the year in Entomology. The collections of Lepidoptera sent in for the prizes were good, and several new species have been added to the list of moths found in the neighbourhood.

The chief innovations of the year have been the Conversazione and the Entomological Field-day, full accounts of which will be found in the following pages. The success with which both experiments were attended leads us to hope that it may be found possible to repeat them, although it is doubtful whether we shall again obtain a suite of rooms so perfectly adapted to the purpose as that which Mr. and Mrs. Matthews so kindly placed at our disposal for our first Conversazione.

The acquirement of an Electric Lamp during the year has opened a new and wide field for future lectures. For this also we are partly indebted to Mr. Wickham who made a special grant to the Society for the purpose.

The close of the thirteenth year of our existence has been marked by the resignation of our Founder. We cannot allow this opportunity to pass without assuring Mr. Carr that he will be followed in the retirement which he has so well earned by the best wishes of all members of the Society. The kindly interest which he has always taken in all matters connected with our welfare, even after ceasing to take an active part in the management of the Society, seems to justify the hope that the short distance by which he will be separated from us in his new home will not prevent our sometimes having the pleasure of welcoming him at our meetings.

The entomologists have also lost a friend in Mr. Bevir to whose unfailing energy a large part of the interest shewn in this part of our work must be attributed.

Our thanks are once more due to Mr. P. H. Carpenter and also to Dr. Nicolson for their kindness in lecturing to us.

RULES.

1. That this Society be called the "Wellington College Natural Science Society."

2. That the Society consist of Honorary Members, Corresponding Members, Members, and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary, and Treasurer, and of the Keepers of the Albums.

5. That the officers, with the addition of Two Members, who shall be elected at the first P.B.M. of every term, do form a Committee of Management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers be elected annually at the last Meeting of the Midsummer term.

7. Tnat the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s, and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the Term. Associates elected after Half Term pay no subscription for the Term.

18. That at every P. B. M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended fer exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description, further, that all Exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers be told off to collect the Exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the Sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed Five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

OFFICERS.

PRESIDENT—S. A. SAUNDER, Esq.

VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD.

SECRETARY—R. R. OTTLEY. | TREASURER—C. T. LAVIE.

ALBUM KEEPERS.

- ETHNOLOGICAL—T. C. PAKENHAM.
- GEOLOGICAL—B. L. SCLATER.
- BOTANICAL—C. R. ASHBEE. B. L. SCLATER.
- ZOOLOGICAL—F. H. GREEN-WILKINSON.
- METEOROLOGICAL—D. H. BARKER. J. M. COODE.
- ENTOMOLOGICAL—E. G. KING. J. C. INGLIS.

CORRESPONDING MEMBERS.

THE LORD BISHOP OF TRURO.

- CANON TRISTRAM, D.D.
- PROF. RUPERT JONES.
- B. E. HAMMOND, Esq.
- CAPT. C. COOPER-KING, F.G.S.
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- H. W. EVE, Esq.
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- O. AIRY, Esq.
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- P. H. CARPENTER, Esq.
- T. L. MACKESY, Esq.

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- F. J. TUCK, Esq.
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- E. A. UPCOTT, Esq
- H. F. NEWALL, Esq.
- C. H. ALLCOCK, Esq.
- H. AWDRY, Esq.
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- A. L. HARRISON.†
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- H. T. BROOKING.‡
- E. A. MITCHELL-INNES.
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- H. G. LYONS.*
- D. H. BARKER.
- C. T. LAVIE.
- H. B. HOPGOOD.
- R. H. CRADDOCK.†
- B. L. SCLATER.
- J. A. C. SKINNER.
- G. B. BEHRENS.
- T. E. CRAWHALL.
- J. C. INGLIS.
- F. H. GREEN-WILKINSON.
- J. M. COODE.

ASSOCIATES.

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- R. B. WEBB.
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- Y. R. BURGES.
- E. E. COOKSON.
- C. HUDLESTON†
- P. HAWKES.
- C. H. SANCTUARY.
- H. D. GORDON.
- F. H. F WEIGALL.
- J. W. W. WEIGALL.
- J. S. MARRINER.
- F. G. WATERER.
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- R. H. S. F. HUTCHINSON.
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- E. W. NELSON.
- E. S. E. HARRISON
- A. W. BLUNT.
- D. ARBUTHNOT.
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- P. N. SALMOND.
- S. B. PEACOCK.
- R. J. BENTINCK.
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- W. HARLAND.
- C. O. SHIPLEY.
- E. G. WETHERALL
- R. H. St. MAUR.
- L. J. FOX.
- C. H. MEARES.
- A. R. MONTAGU-STUART-WORTLEY
- G. L. S. RAY.

* Left Lent, 1882. † Left Midsummer, 1882. ‡ Left Christmas, 1882.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College	...	N.H.S.
Cheltenham ,,	...	N.H.S.
*Marlborough ,,	...	N.H.S.
Clifton ,,	...	N.H.S.
*Rugby School ...	...	N.H.S.
*Dulwich College ...	...	N.H.S.
*East Kent ,, ...	...	N.H.S.
*Haileybury ,, ...	...	N.H.S.
*Birmingham School	...	N.H.S.

*U. S. Geological Survey.

*Birmingham Nat. Hist. and Microscopical Society.

Linnæan Society.

Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	13	5	5
Subscriptions:			
Lent Term—Honorary Members ...		12	0
,, Members and Associates...	4	11	0
Easter Term—Honorary Members ...	2	5	0
,, Members and Associates	4	13	0
Michaelmas Term—Honorary Members		15	0
,, Members and Associates	4	12	6
Grants from the Master	15	0	0
Donation by the President	5	0	0
By sale of Report	9	12	0
	£60	5	11

Examined and found correct, S. A. SAUNDER,
Dec. 9, 1882.

Expenditure.

	£	s.	d.
Daily Weather Charts	1	0	0
Gardener, for keeping Charts during holidays		5	0
Negretti and Zambra for Meteorological Instruments	7	8	6
New fence, &c., round Meteorological Instruments		12	6
Ladd, for Electric Lamp, Prisms, &c. ...	11	18	0
,, for refilling gas jars and new Jet for Lantern	8	6	0
Becker, for Grove's Battery	16	14	6
,, for Acid	1	2	4
Stand for Electric Lamp for Conversazione		5	0
Squires, for charging battery, &c. ...		5	0
Hire of slides		8	4
Lepidoptera Prize		9	6
Carriage of parcels	1	8	4
Postage		6	6
Bishop, for printing Report, Notices, &c.	10	4	4
Anastatic Ink		2	6
Balance in hand	4	9	7
	£60	5	11

C. T. LAVIE, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 4th.

The Rev. P. H. Kempthorne read a paper on "The Planets," illustrated by the Oxy-hydrogen light.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Carr and carried unanimously.

Saturday, February 18th.

R. R. Ottley read a paper on "Noted stars and star groups."

This paper dwelt chiefly upon the arrangement of the constellations with regard to one another, and their resemblance to the objects they nominally represent. Most of the constellations belong to well defined groups, each with astrological, mythological, and, by parallel interpretation, Christian significance. Thus there is the group of Hercules, Draco and Ophiuchus, which may pass for Adam, the Serpent, and our Saviour, or may be mythologically explained. There is the group of large animals, the Bull, the Lions, the Bears; there is the family group of Cepheus, Cassiopeia, Andromeda, Perseus and Cetus, which last may also be classed among the watery monsters, with Hydra, Pisces and Piscis Australis; there are also the birds, Cygnus, Aquila, and (originally) Lyra, and the great group of Centaurus, Ara, Argo and Lupus, in the South, interpreted as Noah making an offering (Lupus being the victim on an altar) after coming forth from the Ark. Corvus is the raven, which is represented on the back of Hydra, no land being available. The figures of some constellations are now presumably more difficult to make out than formerly, their position having shifted from the upright, owing to the precession of the equinoxes: Argo, Centaurus, and even Orion have suffered from this cause. In the Zodiac, or near it, are the four principal stars Aldebaran, Fomalhaut, Antares and

Regulus, two of which, one white and one red, are low down, and two, one white and one red, high up, when they south, in our latitudes; the differences in Right Ascension between the corresponding members of each pair being nearly equal.

Many of the slides procured for this lecture were on too small a scale to be seen by any except the nearest of the audience; but some, contrasting celestial with terrestrial bears, were duly admired.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Matthews and carried unanimously.

Saturday, March 4th.

H. F. Newall, Esq. gave a lecture on "Curve lines and Pendulums."

The first part of the lecture referred to methods of drawing straight lines or solving the problem of rectilinear motion. Three models of linkwork were exhibited; in the models narrow strips of rosewood veneer were used for the links and small "paper-fasteners" for the pivots. (i) Watts' three-linked apparatus, in which a short link has its two ends pivotted, each to one end of two equal links about twice as long; the free ends of the longer links are attached to pivots fixed on a board, the links being disposed to one another in the form of a Z, of which the top and bottom lengthened correspond to the longer links. A pencil passed through the middle point of the short link describes, in two parts of the curve that it draws, what is very nearly a straight line. (ii) Tchebicheff's three linked apparatus, which differs from the preceding only in the position of the fixed pivots; these are placed at a distance from one another twice as great as the distance between the pivots on the short link, and the pencil draws a line approximately straight, and parallel to the line joining the fixed pivots. (iii) Peaucellier's Cell, a seven-linked piece, invented by a French Officer in 1864, and probably the first instrument ever constructed capable of drawing an accurately straight line. In this piece, four equal short links are pivotted together so as to form a rhombus: opposite angles of this are pivotted, each to the end of a long link: the other extremities of the long links are pivotted at one fixed point. A seventh link is pivotted at one end to one of the free angles of the rhombus and at the other end to a fixed point which is at a distance from the other fixed point equal to the length of the seventh link. If the pivot at the remaining free angle of the rhombus be a pencil passed through the links, this pencil will describe a straight line, which is more accurate the more carefully the apparatus is made.

The principle of Blackburn's Compound Pendulum was then explained and exemplified by a heavy weight suspended by two ropes from two points in the ceiling. The motion of the swinging weight is the result of the combination of two motions of different periods and at right angles. Other means of combining rectilinear motions were exhibited; one, in which two such motions are given by two pendulums, which vibrate at right angles to each other, to one pen, which traces a record of its movement on a fixed card: a second, in which a pen is moved by a pendulum backwards and forwards in a straight line, whilst the card, on which it writes, is moved by a second pendulum vibrating at right angles to the first.

Finally, examples of various curves drawn transparent on smoked glass, were projected on the screen by means of the Lantern.

At the conclusion a vote of thanks for the lecturer was proposed by Mr. Kempthorne and carried unanimously.

Saturday, March 18th.

J. G. Barford, Esq. gave a lecture on "The hand and arm."

This was in continuation of the course of Anatomical lectures commenced by Mr. Barford at the end of the previous term.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Penny and carried unanimously.

Saturday, March 25th.

J. G, Barford, Esq. exhibited and explained a number of anatomical slides illustrating the circulation of the blood, the action of the heart and lungs and the processes of digestion.

These slides formed part of a series the purchase of which had been sanctioned by The Master and which were to pass into the possession of the Society.

At the conclusion of the lecture a vote of thanks to Mr. Barford was proposed by Mr. Kempthorne and carried unanimously.

Saturday, May 13th.

T. E. Crawhall read a paper on "Coal Gas."

The lecturer began with a short historical introduction, noticing the first discovery of a natural inflammable gas by the Chinese, then mentioning the name of Murdoch, a Scotchman, who lived

at Redruth, in Cornwall, and was the first to light up his house with the gas, then that of Clegg, who introduced the retorts used in the manufacture, and lastly that of Albert Windsor, who was the first to apply the new light to the street illuminating. He lit up Pall Mall with gas in the year 1807.

Next there was noticed a spontaneous evolution of gas at White Haven, this jet burned with a flame two yards high and one yard in diameter, and lasted for two years and nine months.

Then the lecturer passed on to the manufacture and purification of coal gas; commencing with the heating of the coal in close retorts, generally made of clay, but sometimes of iron, the former being the better. In this process which is called "Destructive Distillation," the coal is not burnt up, on account of the absence of oxygen, but it is split up into certain gases, some of which are impurities, and should be, as they generally are, removed before the gas is delivered for consumption.

During the "Destructive Distillation" the coal is split up into the following gases and liquids:

Light giving constituents.

Gases	Acetylene
	Ethene

Impurities.

Gases	Sulphuretted Hydrogen	removed by Lime
	Ammonia	,, Water
	Carbon Monoxide	passes on
	Carbon Dioxide	partially removed by water
	Marsh Gas	passes on
Liquids	Carbon bisulphide	
	Tar	

The two gases Acetylene and Ethene are the chief constituents of coal gas, each burning with a luminous flame. That the latter does so was shewn by experiment. The gases and liquids, in a state of volatilisation, pass into the "Atmospheric condensers" which are vertical pipes made of iron in the shape of the letter U turned upside down over a trough in which is some ammoniated water. The gas is here cooled and the ammonia together with a little of the Carbon Dioxide is absorbed by the water.

Then, the gas passes into the "Scrubber," which is a hollow iron pillar filled with coke over which more water runs, this absorbs more of the same gases.

From the Scrubber the gas passes into the "Lime Boxes," and the lime removes the Sulphuretted Hydrogen, forming with it a green compound which is deposited on the lime.

From the Lime Boxes it goes to the Gasometer, hence to the houses.

In conclusion the lecturer mentioned some of the products which can be obtained from the tar by redistillation among which the aniline dies are conspicuous.

Many of the properties of the gases referred to in the lecture were demonstrated by experiment.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Newall and carried unanimously.

The President announced the donation to the Society of a collection of Lepidoptera by Mr. Awdry and proposed a vote of thanks to the donor which was carried unanimously.

Saturday, May 27th.

P. H. Carpenter, Esq. gave a lecture on "Extinct Animals."

The lecturer began by describing the different Geological periods of the history of the Earth, during which various animals lived and died, some terrestrial, and others aquatic. The human period is only the latest of a vast series of Epochs. The rock masses which were deposited during these periods fall into three great groups, (1) Palaeozoic, (2) Mesozoic, (3) Cainozoic or Tertiary. In the Palaeozoic period the flora and fauna were widely different from those of the present time; in the Mesozoic the difference was not quite so wide, but many fossil vertebrata cannot be referred to existing orders, as for example, the great sea lizards, the flying reptiles and the toothed birds. In the Cainozoic period some Marsupial Mammals are represented and all the reptiles are referable to existing orders, but toothed birds still exist. The extinction of the species is in some cases sudden and complete, as in the case of Trilobites, Blastoids and Cystoids in Palaeozoic times, or the Ammonites and large Reptiles, at the end of the Mesozoic times. In other cases species have lingered on from the Palaeozoic to the Tertiary period and then died out, while many groups, formerly abundant, are now represented by isolated genera, such as the Ganoid fishes and the Siliceous sponges. Some have lived into the human period and then become extinct as the Dodo amongst the birds, or the Mammoth amongst the Mammals, whilst others, such as the Musk Ox, are now exceedingly rare. Many extinct forms serve to break down the intervals between existing types. Ruminants and Pachyderms were classed by Cuvier as most distinct orders of Mammals: but now Pigs and Hippopotami are classed together with Ruminants as even-toed animals, while

Elephants form a separate order, and the Rhinoceros and Tapirs are odd-toed; the gap between birds and reptiles is continually being filled up.

The lecturer then showed us some slides of the most important extinct animals, among others Trilobites which when young are somewhat like young King Crabs. Ganoid fishes from the Old Red Sandstone. Labyrinthodons also called Cheirotheria, rather like very large toads. Ichthyosauri, lizard-like animals with thick necks, long heads, long tails, and paddles like those of a whale. Plesiosauri with small lizard-like heads, long necks and also paddles like whales. Pterodactyles, flying reptiles as much as 25 feet across the wings. Teleosauri, like crocodiles; and several other kinds of Saurians. Among extinct birds the Archaeopteryx, the oldest known bird, from Solenhafen, in Bavaria. The Moa or Dinornis, allied to the Apteryx or Kiwi, which stood 10 feet high, and eggs of which have been found fossilized; it lived during the human period in New Zealand. The Dodo or great ground dove of Mauritius, first seen by the Dutch, which was incapable of flight; it was soon destroyed after the colonization in 1644, the last recorded specimen having been seen in 1681. After this came the Mammals: first the Deinotherium, a kind of Elephant with tusks turned downwards which were used as pick-axes; then Mastodons, that lived in America, whole skeletons having been found in the swamps of Kentucky, with tusks 12 feet long turned upwards from the upper jaw. Mammoths, bones of which are abundant in the Northern Hemisphere, and which must have lived during the human period, since the tusks are found in bone caves with figures cut on them. The last slide shewn was one of the Irish Elk, an animal intermediate between the Roe deer and the Fallow deer, the first perfect skeleton of which was found in Isle of Man, although it was more plentiful in Ireland.

At the conclusion a vote of thanks was proposed by Mr. Carr and carried unanimously.

Saturday, June 10th.

J. G. Carew-Gibson read the successful Pender Prize Essay on "Locomotives" illustrating the paper partly by slides shewn by the Oxy-hydrogen light and partly by moving models, one of which had been made by himself.

The essay commenced with a historical sketch of the Locomotive.

The first travelling engine was made by Cugnot, a French officer, it was intended for hauling cannon, but after knocking

down a wall or two, and performing various other feats of a like nature, it retired from active service into a French museum, where it may still be seen.

The first English locomotive was made by William Murdoch in 1784; it was a model on three wheels, two drivers 9½ inches in diameter and one steering wheel 4¾ inches in diameter, the cylinder had a bore of ¾ in., and a stroke of 2 ins.; the boiler was heated by a spirit-lamp and had one straight flue tube through it. In spite of its small size, however, it is recorded to have beaten its inventor in speed. After the trial of his model, Murdoch appears to have given up the idea of steam locomotion.

The next locomotive was built by Richard Trevithick, a Cornish engineer, in 1802. Trevithick's engine was a road locomotive of a more useful size, and is said to have worked fairly well. The third engine was also built by Trevithick, but it was for a tramway; this engine drew a load of 10 tons at the speed of 5 miles per hour on a level, and was the first railway locomotive made. After this, there was not much improvement in the construction of locomotives till 1814, when George Stephenson built his first engine at the Killingworth colliery; this engine had the cylinders sunk vertically in the top of the boiler, and was the first of the "Puffing Billy" class.

There was not much change in locomotive building till 1829, when the Liverpool and Manchester line being nearly completed, the directors were anxious to determine what was the best motive power to use on their railway; stationary engines and horses had been proposed and were not found to satisfy all requirements; so at length the directors decided to give the locomotive a trial; they accordingly offered a prize of £500 for the engine which should best fulfil the following conditions.

"(1) The engine to consume its own smoke.

(2) An engine of 6 tons weight to draw 20 tons at 10 miles per hour, with a steam pressure of not more than 50 lbs on the square inch.

(3) Two safety valves to be provided, one beyond the reach of the driver.

(4) The engine to have springs, and six wheels, and to be not more than 15 feet high to the top of the chimney.

(5) The total weight of six tons to include water; but a less weight to be preferred if drawing a proportionate load; and an engine weighing only 4½ tons might be put on four wheels.

(6) A mercurial gauge to show the pressure above 45 lbs per sq. in., and to blow out at 60 lbs. to be provided.

(7) The engine to be delivered in Liverpool, not later than the 1st of October 1829.

(8) The price of the engine to be not more than £500."

The time for delivery was afterwards extended to the 6th of October.

The competing engines were—

The "Novelty," Messrs. Braithwaite and Ericsson, the "Sanspareil," Timothy Hackworth, the "Rocket," R. Stephenson, and the "Perseverance," Burstall.

The "Novelty" was the favorite engine with most of the spectators; it was a well built machine on four wheels, carrying its own fuel and water, without a tender, but first its blast bellows gave way, and then one of its pipes burst, which put it out of the contest. The "Sanspareil's" boiler first came to grief, and on the third day of the trial its pump broke.

Of the two remaining engines, the "Rocket" and the "Perseverance," the "Perseverance" could only go 6 miles an hour, so the prize was awarded to the "Rocket"; which was an engine on four wheels, the two front ones being drivers; the chief reason for the success of the "Rocket" was the adoption of 25 small copper flue tubes instead of one large one, which was common at that time. The greatest speed attained by the "Rocket" was 35 miles per hour with no load. After the "Rocket," Stephenson built many more engines, of greater size and weight, but they were found to injure the rails, so a third pair of wheels were added behind the fire-box, and the cylinders were placed inside the smoke-box, between the frames. Since that time up to the present date, locomotives have gone on increasing in size and weight, but there is still a strong likeness between Stephenson's engine of 1845 and the modern locomotive.

Locomotives may be divided into two classes with regard to the framing; viz. (A) Those having a frame composed of two main slabs of iron running the whole length of the engine. (B) Those having a frame composed of four slabs, two on each side. Into two classes with regard to the cylinders, viz. (A) engines with cylinders between the frames; (B) out-side cylinder engines. And thirdly into (A) single engines, or engines having only one pair of drivers; and (B) those having one or more pairs of wheels coupled to the drivers, in order to obtain more adhesion on the rails; goods locomotives, and engines for heavy passenger work, are generally coupled.

Every locomotive consists essentially of three parts. (A) The

carriage, wheels, frame, &c. (B) The boiler. (C) The engine proper, where the steam generated in the boiler is used, and its power transmitted to the driving-wheels.

The frame plates are massive pieces of iron, about an inch thick, and having a ruling depth of about 15 inches, and frequently over 20 ft. long. The driving wheels vary from 4 ft. 6 in. to 8 ft. 1 in., and the carrying wheels from 3 to 4 feet in diameter.

The boiler consists of six principal parts, viz. the barrel, the external fire-box, the internal fire-box, the flue tubes, the smoke-box, and the chimney.

The barrel is always made of the best iron plates about ½ inch thick riveted together. The internal fire-box is always of the best copper, and is stayed to the external box by copper stay-bolts, placed about 4 inches apart each way. The tubes are of brass, about 2 inches in diameter.

The engine consists of the two cylinders, and their valves and valve-gear, also the pistons, piston-rods, and connecting-rods.

The tender, which accompanies most locomotives, consists of a large water tank, upon the top of which the coal is carried; its wheels and framing are the same as those of the engine.

Most locomotives now work at a pressure of 140 lbs on the sq. inch; and lately very high speeds have been attained; the highest at present being 92 miles per hour, made by the "Fontaine" locomotive.

At the conclusion Mr. Carr expressed the pleasure with which he had listened to the Essay and reminded the Society that the subject chosen was a peculiarly appropriate one as Mr. Pender himself had always taken a great interest in engines.

Saturday, July 1st.

The President read a paper on "Some causes of colour in natural bodies."

The lecture opened with a short account of Newton's discovery of the compound nature of sunlight, and a spectrum, obtained from the electric light, was thrown upon the screen. Some pieces of coloured glass were then interposed in the path of the light, and it was shewn that their colour was due to the fact that they

allowed some rays of the spectrum to pass through, whilst they stopped or absorbed others.

The cause of colouration in an opaque object was explained as being due to the fact that the light by which it is seen has traversed a very thin layer of the substance before it is reflected to the eye, and that during its passage through this layer some of the rays are absorbed, just as they were in passing through the glass.

The lecturer then passed on to the effects of the mixture of different coloured lights, the combination being effected by means of Professor Clerk Maxwell's colour top. For this instrument a number of discs of coloured paper are prepared each having a slit cut from the centre to the circumference, two or more of them are then placed on the top and so arranged that part of each is visible from above, the rest of the disc being covered by the others, while by turning one disc relatively to the rest more or less of it may be brought into view and the colours thus made to appear in any desired proportions. On spinning the top rapidly the colour due to the true mixture of the different coloured lights is obtained, and this is frequently very different from that obtained by the mixture of the corresponding pigments on a painter's pallette. In the latter case the small particles of the pigments being spread in several layers over the surface of the paper the light reflected to the eye is, as will be seen from the previous explanation of the cause of the colour, for the most part only that which can get through both sets of particles, and the effect produced by this may be and very often is quite different from that produced by the mixture of all the rays which can get through one set of particles with all those which can get through the other set.

This difference is particularly noticeable in the case of blue and yellow; the only rays which can get through both blue and yellow colouring materials are the green (this was shewn with coloured glasses), and consequently when blue and yellow pigments are mixed the result is a green pigment; but when blue and yellow discs were placed on the top the colour resulting from the mixture of all the rays reflected by each was found to be a neutral grey.

The cause of the different colour sensations was explained on the theory, due originally to Young and more recently advocated by Helmholtz, that the nerves which connect the eye with the brain may be divided into three groups, those of one group being most powerfully affected by red rays, those of the second by green and those of the third by blue or violet; other colour sensations are on this theory produced by the joint action of two or all of these sets in varying degrees, and the sensation of white light is

obtained when all three are equally excited. In this way was explained the production of grey by the mixture of blue and yellow lights referred to above, since the yellow affected both the red and green nerves whilst the blue light affected the green nerves slightly and the blue more powerfully.

The ordinary phenomena of colour blindness were explained as generally due to the total or partial faliure of the red nerves.

The principles on which the explanation of colouration by absorption depended were further illustrated by means of a sodium flame. The spectrum of sodium was first thrown on the screen and it was shewn that the light given out was all of nearly one colour. Some sodium was then placed in the non-luminous flame of a Bunsen burner and all objects illuminated by this light appeared almost entirely colourless, the reason being that however much or little of the light they might absorb the remainder, which they reflect, must be always of the same colour as the original light.

The lecture concluded with a brief account of a few exceptions to the general principles noticed above. Thus the well known yellow colour of gold is produced in the act of reflection and is not due to the absorption of light which has penetrated the substance and then been reflected. By transmitting a beam of light from the electric lamp through a piece of gold leaf it was shewn that light which has passed through gold is coloured green.

Again there are other substances, known as fluorescent and phosphorescent substances which have the power of actually altering the colour of the blue and sometimes of the other rays of the spectrum; specimens of these substances were held in a beam of light which had passed through a piece of blue glass and were found to transform the light some to green, some to yellow and others to red.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Carr and carried unanimously.

The President announced the donation to the Society of some microscopic preparations, mounted by J. C. Inglis, and proposed a vote of thanks to the donor.

Saturday, July 15th.

Mr. and Mrs. Matthews having kindly offered the Society the use of their new house, a Conversazione was held there, after evening Chapel, to which the greater part of the Society and many visitors from the neighbourhood were invited. The five

rooms on the ground floor were used one for physical apparatus and experiments, the next for Natural History specimens and collections, the third for microscopes, the fourth for curiosities of general interest and ethnological specimens, and the fifth for refreshments.

In a corner of the first room a compound pendulum was to be seen drawing curves of various degrees of complexity, while on the table in the centre were several microphones, under the charge of Crawhall, and Cairns' printing press which during a part of the evening attracted considerable attention. Photographs of locomotive engines lent by Carew-Gibson and specimens of curves drawn by the pendulum were arranged about the room.

The large room in the centre was devoted to the exhibition of Natural History objects. To the left on entering were displayed several entomological collections. In the first place there was the school collection of British moths and butterflies, the most interesting among which was a good specimen of Chærocampa Celerio, the Silver Striped Hawk Moth, lately captured in the neighbourhood; next to these were the Society's collection of foreign butterflies, moths, and all kinds of insects, centipedes, rhinoceros beetles, spiders and scorpions, together with some very fine specimens of Indian beetles lent by the Rev. Cecil Wood. Perhaps to those interested in the N.S.S., the most interesting collection on this table was that of Coleoptera, Diptera, etc., all found in this neighbourhood, which had been carefully arranged and classified out of several loan collections by J. S. Marriner, who himself lent the larger part of the collection; amongst these the insect which gained the largest share of notice was the Gryllo Talpa Vulgaris the mole cricket which a few years back was common in the neighbourhood of St. Sebastian's. On the table to the right were displayed the collections for the annual Lepidoptera prizes, and the rest of the table was occupied by hornets' and wasps' nests, and miscellaneous objects of general interest. The most imposing feature in the room was the long table on which were displayed the large treasures of the Society, at the back were cases of stuffed animals, while in front were a variety of stuffed birds on perches, and small quadrupeds, together with a very good specimen of an Ornithorhyncus or Australian Duckbill, lent by Mr. Penny, which attracted much attention. Then there was the N.S.S. collection of British Birds' Eggs, which has rather suffered from neglect, but still is very rich in Gulls' eggs, by the side of this was a very fine collection of eggs lent by F. H. Green-Wilkinson, to whose care and taste were largely due the arrangement of the middle table.

Before passing from the room entirely we may mention an unpleasantly natural arrangement of reptiles, crawling about among stones and moss in one of the corners. Besides

foreign Ichneumonous Lizards and Snakes, there were some very fresh and good specimens of local snakes, stuffed by J. Arkwright, a very large female adder, some grass snakes and a specimen of Coronella lævis, the smooth-crowned snake, which though not a common English specimen has been taken once or twice lately in the neighbourhood.

Taken as a whole the exhibitions in this room were very good, and both members and visitors expressed their surprise at the richness of the Society, and regrets were expressed that so many objects of interest should not see the light more frequently than they do.

This room was illuminated by a Duboscq electric lamp, worked by the Society's newly acquired battery of 50 Grove's cells. A collection of fluorescent solutions and some specimens of phosphorescent paint shewed to advantage under the brilliant light.

The next room was devoted to microscopes both monocular and binocular, and in the centre was a table covered with books relating to microscopy. This room was presided over by Ashbee and Inglis. Here were to be seen spiders' legs, bees' and wasps' stings, crystals glowing under the gorgeous colours due to polarised light, tadpoles so arranged as to shew the circulation of the blood in their tails, and many minute and horrid monsters. The microscopes were lent by The Master, Mr. Penny, Mr. Kempthorne, Mr. Irving, Mr. Lane, Mr. Newall, Ashbee, Inglis, Pell, and others.

As we passed into the next room in which were arranged the Ethnological collections of the Society, the eye rested upon several tables covered with objects recently presented to the Museum. Perhaps the most noticeable were some handsome swords of Oriental workmanship brought from Candahar by Lieutenant Faithfull (O.W.), and some very beautiful pieces of silvered bronze made near Algiers, which had been kindly lent by the Rev. A. Carr. This room was arranged as a drawing-room, and during the evening some of the visitors were so kind as to enliven the proceedings with a little vocal and instrumental music; a telephone connected with the piano enabled persons assembled at the further end of the house to enjoy in some measure this part of the entertainment.

On the lawn a few of the visitors obtained views of some double stars through Mr. Kempthorne's and Mr. Saunder's telescopes; unfortunately neither the Moon nor any of the larger planets were visible, whilst such observations as could be made were much interrupted by clouds.

Saturday, September 30th.

F. J. Tuck, Esq. read a paper on "Glaciers."

The theory of the birth, growth, motion and decay of glaciers,

which is the one most generally received in the present day, is that of Professor Tyndall who has spent much time and labour in obtaining a series of measurements and observations in support of it.

Glacier is the name given to the masses of ice on the sides of high mountains both above and below the snow line. These can be divided by their outward appearance into three classes, according as they most resemble a Sea, River, or Waterfall. Slides were here shown to illustrate these formations; the sea formation was seen in a view of the Mer de Glace, shewing the wavy appearance of the surface and also in a view of the great Aletsch glacier looking upwards. The river formation was illustrated by another view of the Aletsch glacier looking downwards, and the magnificent icefall of the Rhone glacier was the best possible example of the waterfall formation.

The vapour in the air coming from the hot plains of the south is condensed from its contact with the cold peaks in the high altitudes, and falls as snow; and above the snowline where more snow falls in winter than is melted in summer, successive layers are formed year by year on the nevè or firn. The pressure on the lowest layers is so great that the air is pressed out and the snow is transformed into blue ice which is forced down the beds of the glaciers at an incredibly slow pace varying from 2 to 22 inches a day, and fills up the channel completely.

Scientific men have advanced various theories to explain this motion. Some thought that the water in the crevasses froze at night, and by the consequent expansion forced the glacier down; but this is inconsistent with recent discoveries in heat. Others look upon ice as a plastic or viscous body which moulds itself into all the bends of its bed, but experiments prove this to be untenable. Tyndall advances the regelation theory which is now generally received. It is found that if ice is broken and the pieces pressed together, they will freeze together, as the ice at the points of contact melted into water by the pressure forms again directly the pressure is removed. The descending ice stream acts just like a stream of water; it moves quicker at the centre than at the sides and at the surface than near the bottom, so the ice in a vertical section at right angles to the line of motion does not move all at the same rate, and as ice cannot resist a great strain, it is split up into crevasses, which slant upwards from the sides to the centre of the glacier, since the ice at the sides gets left behind and the direction of the strain is consequently inclined downwards. These crevasses widen out and close up again according to the forces acting at different points of the course. If the glacier descends rapidly the ice is broken in different directions, and innumerable peaks and pinnacles of ice are formed which are called seracs.

Rocks falling from the mountains banding the glacier, prevent the ice from melting under them, and a fringe of rock rises above the surrounding surface as it melts, and forms what is called a lateral moraine. When two glaciers join, the lateral moraines become medial moraines giving the surface of the ice a streaky appearance when seen from a distance as was shewn in slides of the Gorner glacier. Ice tables are formed of isolated rocks which have rolled far into the glacier and by protecting the ice beneath from melting get raised above the level of the surface.

Minature icebergs can be seen in the Margelen See formed from the breaking of the side of the Aletsch glacier when it is undermined by the waters of the lake which it passes in its course. The friction of the ice and of stones imbedded in it against the bottom and sides of the bed grinds the rocks down to great smoothness, and lines are seen in the surface of the ground, in the direction of the motion of the glacier, caused by the passing of blocks of stone. Instances of this action are seen high up in the Hasli Thal by the Handeck Falls, and also in many other places, as in Scotland, which was once partly covered with glaciers in remote ages. The loose stones at the bottom of the glaciers wear deep holes in the weak places of the bed as they are whirled round and round by the passing of the glacier above them. This is very clearly seen in the glacier garden at Lucerne.

The water from the melting of the glacier works its way downwards among crevasses, and issues from a cavern at the lower end as a turbid torrent, carrying with it a vast amount of matter in suspension, which comes from the particles of the rocks ground down by the glacier.

Since more water issues from the glacier in summer, owing to the melting of the snow and the surface, than at other times, a supply is sent down to water the lower lands at a time when it is most wanted, and thus glaciers play an important part in nature; many great rivers have their sources in glaciers.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne and carried unanimously.

The President announced the following donations to the Society:

A collection of 35 coins given by Mrs. Wetherall.

Two unstuffed birds Ardea Pacifica and Ardea Novæ Hollandæ shot and presented by F. D. Ringrose (O.W.)

A collection of British Plants dried, mounted and presented by C. R. Ashbee (O.W.).

The Report of the Smithsonian Institution for 1880, presented by the Board of Regents.

Votes of thanks to the donors proposed by the President were carried unanimously.

Saturday, October 28th.

D. Nicolson, Esq., M.D., read a paper on "Training and development of the mind."

The Lecturer commenced by drawing a short comparison between man in the civilised and in the uncilivised state. The transition from one to the other must of necessity be gradual, and is the outward and visible sign of the development of the mind. Later generations represent the distinctive intellectual advances of the generations that have preceded them, and we have the advantage over our predecessors in so far as we have power to benefit, and do benefit, by their experience. The capacity for taking advantage of this accumulation of intellectual experiences is handed on from one generation to another, and we thus arrive at what is termed the hereditary transmission of qualities.

The capacity for intellectual development is dependent upon a material structure which is the organ or seat of the mind; this structure is called the Brain. The Brain receives communicatrons from the outer world by means of the nerves, consisting of nerve fibres and cells. These nerves run to a series of common centres at the base of the brain, to which, in the first place, a sensation or impression from without is carried. This impression is carried up through the central portion of the brain to the superficial or Cortical layer, by the activity of whose substance the personal consciousness of the individual is revealed to him. The impression is here recorded as an *idea* becoming *thought* in consequence of the change its presence effects upon the particle of brain matter with which it comes in contact. This 'thought' now represents the mental side of the operation, and it, in its turn, expresses itself in action by transmitting downwards, through a different set of nerve fibres, a command or order which the muscles carry out. Thought is thus expressed in action.

The superficial layer, or what is called the grey matter, of the brain becomes the store house of impressions, notions, ideas and thoughts which are capable of acting and reacting upon each other, constituting a complex group of operations and phenomena which we call Mind. The properties of Mind may for the present purpose be taken as coming under three heads; first, Feelings or Emotions; secondly, Intellect; and thirdly, Will. Under the first head come our sensations as conveyed to us through organs of sense, such as vision, hearing, or touch.

This is the region of pleasure and pain, of love and anger, of happiness and misery; this is the emotional home of the æsthetic delight in symmetry and beauty, and this it is that feels the pang of sympathy with sorrow and distress. The second property of Mind is Intellect; this is the region of the acquirement of knowledge and comprises such functions as memory, judgment, and imagination. It is in the development of the Intellect that the civilised man is superior to the savage. The importance of attending to the development of the intellectual powers cannot be overrated. Whatever their capacity in any one individual may be, they serve to adjust that individual to his surroundings, and become his regulator through life. The third property of Mind is Will; this comprises the region of determination and of self control, and has to do with the outward expression of thought in action. The exercise of an independent Will is the highest purely mental prerogative of man.

In the culture and training of the mind and in the formation of character three factors or influences are brought to bear; first the original physical and brain capacity which the individual inherits from his parents and ancestors; secondly the influences exerted upon the individual by his guides, teachers and educators; thirdly the power which the individual is capable of exerting upon his own culture. Some have denied the existence of this last influence but, it would seem, upon no reliable grounds.

We are always learning and acquiring knowledge practically so long as we live, but there are three periods or stages at which the development and training of the mind may be said to be taking place; these may be called the periods of childhood, of youth and of maturity. The greatest influence during the first period is exerted by the mother, by whom the child's young nature is readily moulded for good or for evil. In youth the individual has had more experience and begins to think for himself; consequently he contributes largely to the formation of his own character, under the eye of his teachers, who at this period have to deal firmly but kindly with him. He ought at this time to specially endeavour to cultivate the habit of close attention to the work in hand and to develope his power of memory. This is the time when the brain is best able to lay in stores of impressions and ideas. Nothing illustrates this more forcibly than the immense capacity shewn in youth for cramming for examination; but it is the real steady work that tells in after life if any practical advantage is to come of it. There is however one kind of self education which may be practised through all periods of our life, it is the subordination of our emotions, our evil passions and the selfish portion of our nature to those higher influences which our intelligence and our consciousness are always appealing to us to exert.

The Lecture was illustrated by a series of slides showing the configuration and structure of the brain and the principal details of the nervous system.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Carr and carried unanimously.

The President announced the following donations to the Society:

A list of the Foreign Correspondents of the Smithsonian Institution presented by the Board of Regents.

A collection of British Lepidoptera presented by the Rev. W. F. Short.

Votes of thanks to the donors proposed by the President were carried unanimously.

Saturday, November 25th.

T. E. Crawhall read a paper on "The Microphone and Telephone."

The lecture began with a very short introduction on Sound, proving that sound was produced by vibrations, and demonstrating the fact by a simple experiment with a tuning fork. Then the Toy Telephone was explained. The history of the Telephone was next given, explaining Reiss', which however was not articulating.

Some experiments were next performed to show induced currents, and thus the action of Bell's Telephone was explained. Then the different parts of the Telephone were shown, and the use of each mentioned, and also the complete Telephone was exhibited, cautions being given about the putting together of the parts.

The electric bell was explained in detail.

The Microphone was the next thing referred to. Its construction was described and a few different forms of the instrument were exhibited. Some experiments were next performed, in the last of which the sound produced by a camel's hair brush rubbing on the Microphone was rendered audible throughout the room, the sound from the Telephone being greatly intensified by a paper cone placed on it.

The experiments were successful throughout, and some beautiful means of showing very slight induced currents were adopted.

At the conclusion a vote of thanks to the lecturer, proposed by Mr. Kempthorne, was carried unanimously.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Monday, January 30th.

At a P.B.M., the following were elected Associates: W. C. Hall, Hon. G. R. Walsh, J. M. Burn, H. Sharman-Crawford, H. H. Prince Christian Victor of Schleswig Holstein, R. B. Webb.

C. T. Lavie was elected Treasurer.

A. L. Harrison and T. Harrison were elected members of the Committee for the term.

A vote of thanks was passed to A. G. Hunter-Weston the retiring Treasurer.

At a Committee meeting, C. T. Lavie and D. H. Barker were elected Members.

Saturday, February 18th.

At a P.B.M., E. M. Dunne, C. J. E. Parker, R. C. Wellesley, J. T. R. Ridgway were elected Associates.

Monday, March 20th.

At a P.B.M., A. C. M. Croome, Y. R. Burges, E. E. Cookson were elected Associates.

Tuesday, May 9th.

At a P.B.M., C. Hudleston and P. Hawkes were elected Associates.

D. N. Pollock and J. A. C. Skinner were elected on the Committee for the term.

On the motion of C. T. Lavie, Treasurer, (pursuant to notice) it was agreed to add to Rule 17, "that Associates elected after half-term pay no subscription for that term." T. C. Pakenham proposed an amendment, to the effect "that Associates so elected

should not be permitted to exercise any privilege during that term:" this, however, was not carried.

Elected Honorary Members, C. H. Allcock, Esq., H. Awdry, Esq., A. A. Somerville, Esq.

D. N. Pollock and R. R. Ottley (Secretary) were elected as judges for the Pender Prize.

B. L. Sclater was elected Geological Album Keeper.

A vote of thanks was passed to H. G. Lyons the retiring Geological Album Keeper.

F. H. Green-Wilkinson was elected Zoological Album Keeper.

A Committee Meeting was then held, when H. B. Hopgood, J. A. C. Skinner, R. H. Craddock (and under Rule 31) B. L. Sclater were elected Members. P. H. Carpenter, Esq. and T. L. Mackesy, Esq. (O.W.) were elected Corresponding Members, under Rule 15.

Saturday, May 13th.

At a P.B.M., the following Associates were elected: F. H. Green-Wilkinson, C. H. Sanctuary, H. D. Gordon, F. H. F. Weigall, J. W. W. Weigall, J. S. Marriner, F. G. Waterer, R. H. S. Hall, R. H. S. F. Hutchinson, Hon. V. R. B. Wilbraham, E. W. Nelson.

Saturday, May 27th.

At a P.B.M., the following were elected Associates: E. S. E. Harrison, A. W. Blunt, D. Arbuthnot.

Tuesday, June 6th.

At a P.B.M., the following were elected Associates: P. A. Bainbridge, J. M. Coode, A. M. White, P. N. Salmond, S. B. Peacock, R. J. Bentinck.

A Committee Meeting was then held, and the following rules for the Pender Prize were framed:

(i) Competitors must obtain the President's sanction for the subject they select.

(ii) Essays sent in a second time on the same subject must show signs of work done in the interim.

Saturday, June 10th.

At a P.B.M., J. P. Egginton was elected an Associate.

Saturday, September 16th.

At a P.B.M., the following were elected Associates: C. Lyon, A. G. Boyle, C. Parr, S. A. Fane, A. C. Stanley-Clarke, E. H. W. H. Stafford, E. M. Whitbread, W. Pearson, W. Harland, C. O. Shipley, E. G. Wetherall, R. H. St. Maur, L. J. Fox, C. H. Meares.

J. A. C. Skinner and E. A. Mitchell-Innes were elected on the Committee for the Term.

J. M. Coode was elected Meteorological Album keeper.

B. L. Sclater was elected Botanical Album Keeper.

J. C. Inglis was elected Entomological Album Keeper.

Votes of thanks were passed to C. R. Ashbee, E. G. King and D. H. Barker the retiring Album Keepers.

A vote of thanks was passed to Mr. and Mrs. Matthews for their kindness in allowing the Conversazione to be held at their house.

At a Committee Meeting G. B. Behrens, T. E. Crawhall, J. C. Inglis, F. H. Green-Wilkinson and J. M. Coode were elected Members.

Monday, October 9th.

At a P.B.M., A. R. Montagu-Stuart-Wortley and G. L. S. Ray were elected Associates.

R. R. OTTLEY, *Secretary.*

FIELD DAY.

On June 29th, was held the first field day of the Society, an event which had been under discussion for years. The weather was not very favorable, as a thin drizzling rain was falling when we came out of School. However, it was determined in pursuit of Science to brave it, and a party of some ten members of the N.S.S., started from Great Gate in a brake under the conduct of E. G. King, the Entomological Album Keeper, accompanied by Mr. Bull, Mr. Bevir, and Mr. Arthur Sidgwick, the last of whom was staying in the neighbourhood, and had kindly consented to assist. Old Windsor forest was selected as the destination. During the drive thither the members were so occupied in making shandygaff and discussing an excellent lunch provided by the College, that but little was secured *en route* beyond one or two Piniaria.

On arriving the weather seemed to have cleared and the sun came out, the party therefore immediately scattered and began an eager search for objects of interest. The country was well adapted for the purpose, as it presented every variety of wood, fen and heath land; but unfortunately in rather less than two hours the rain again began to fall heavily, and by a strange coincidence the separate members betook themselves to the spot where the carriage had been left, in which there still remained a dozen or two of gingerbeer. However, after each had given a satisfactory account for his early arrival at the rendezvous, the party sat down and compared notes. Owing to the dampness of the day the spoils were no so great as they might otherwise have been, several Fritillaries had been captured together with some Clouded Buffs (E. Russula) male and female; the rest of the collections consisted of Silver-studded Blues, Bordered whites, (F. Piniaria) Heath moths, and other Geometers of no great

rarity. Of the Coleoptera nothing was found beyond the green tiger beetle.

In the open country the frequent fragments of rabbits, and many a trap or isolated post testified to the number of hawks, while in the woods several very large grass snakes had been met with.

After sufficient discussion the party finding that the weather did not improve and that all the gingerbeer was gone, returned home very well contented with their day's work, which, considering the weather, was satisfactory.

It is to be hoped that it will be found possible to repeat expeditions of this kind, as the interest in Entomology has decidedly increased this year, and the collections sent in for the prize were far better than in previous years. There is still very much that may be done in the neighbourhood of Wellington, and there is no way in which it can be better performed than by large parties systematically working a small piece of land.

It may perhaps be as well to remark in this connection that the sugaring at night has not been so productive this year as the year before, though several good specimens were secured. It is to be hoped that both these lines may be followed out in the ensuing year as the school has now, owing to the munificence of the Rev. W. F. Short, the foundations of a splendid collection of Lepidoptera, and it only remains for the hard work and liberality of members of the Society to complete it, at any rate with regard to local specimens.

EXCURSION.

On Thursday, May 18, being Ascension Day, a party of the N.S.S. drove to Windsor. The fine herd of cattle did not show themselves as we drove through the park, but we were consoled by the royal stables, admiring especially the famous greys, and the riding school. Then we adjourned to the Round Tower, where some of the party exchanged *badinage* with the officiating warder, an old Artillery Sergeant, who, notwithstanding, kept us in great order, besides instructing us in the surrounding topography. After viewing Windsor a short time, we walked to Eton, where Mr. P. H. Carpenter, well known to frequenters of N. S. S. lectures, met us, and very kindly conducted us over the Chapel, Museum, Physiological Laboratory and various other buildings: then we took a short walk through the playing fields, where the XI and XXII were playing a match, after seeing a couple of the XXII's wickets fall with successive balls, we left and after tea drove back, the journey being enlivened by the vocal efforts of various members of the party.

PRIZES.

A prize of the value of £5 is given annually by Mrs. Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition.

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two ordinary Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. Preference will be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

7. Competitors are not prohibited from writing a second essay on a subject chosen by them at a previous competition, but should

they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1882 was awarded to J. G. Carew-Gibson for an essay on "Locomotives."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The winners of these prizes for 1882 were

(1) Hutchinson

(2) King

Extra Prize (given by Mr. Bevir) Cookson.

Commended for Classification Burges.

ENTOMOLOGICAL REPORT.

The following specimens have not been recorded before.

FAMILIA 2.

GENUS XII.—LIPARIDAE.

Liparis monacha ..	..Black Arches ..	1881..W.B.L.

FAMILIA 3.

GENUS IV.—BOARMIDÆ.

Boarmia abietaria ..	..Satin Carpet ..	1882..W.B.L.
„ *consortaria* ..	..Pale Oak Beauty ..	1882..W.B.L.

GENUS XV.—LARENTIDÆ.

Emmelesia unifasciata	..Haworth's Carpet ..	1881..W.B.L.
Scotosia dubitata ..	..Tissue ..	24 March, 1882..E.G.K.

FAMILIA 6.

GENUS V.—APAMIDÆ.

Gortyna flavago ..	..The frosted Orange ..Oct.	1882..W.B.L.

GENUS VIII.—ORTHOSIDÆ.

Xanthia aurago ..	..Barred Sallow ..	25 Sept. 1882..J.C.I.

E.G.K.=E. G. King.
J.C.I. =J. C. Inglis.
W.B.L.=W. B. Longsdon.

J. C. INGLIS,

Entomological Album Keeper.

During the year a valuable collection of butterflies and moths has been presented to our Museum by the Rev. W. F. Short, late Warden of St. Paul's College, Stony Stratford, and now Rector of Donhead St. Mary's near Shaftesbury. Mr. Tole, the original collector, who is still living, is a small watchmaker in Stony Stratford, in the North of Buckinghamshire, and was when younger a great enthusiast on the subject. The collection was made chiefly in the Forests of Wakefield and Whittlebury in South Northamptonshire and is a most complete local collection. It contains 55 kinds of butterflies, i.e. within about 10 of the whole number of British Species; and among them are three such treasures as the Large Copper, the Mazarin blue, and the Queen of Spain Fritillary; this last however is a foreign specimen, the only one in the collection.

Of the moths, the Nocturni are excellent, especially the hawk moths, which shew representatives of almost all the British species. Among these the specimen of the Sharp-winged Hawk moth (Celerio) is of special interest. Mr. Tole found it crawling up a window of a house in the Market-square of Stony Stratford with its wings not yet developed. As this is one of the very rarest of all, and was barely recognised as undoubtedly British till comparatively late years, such a discovery was of no small entomological importance. The Noctuæ, though less striking than the Nocturni, are good. To the Geometræ he seems to have paid comparatively little attention, since if the collection has a weak point it is there. But his speciality was the Tineæ, and a most useful speciality too in a School Museum, since, without actual specimens to refer to, few perhaps would pay attention to so difficult a branch, while it is at the same time one in which our heather and pine woods ought to be strong. Whole drawers of these beautiful little insects may be seen in the collection; and among them one drawer of his special subject the "Buttons," of which he found one species never before classed, and which under the name of "Tolana" now immortalizes its discoverer.

It is to be hoped that Mr. Short's most generous gift will greatly encourage our entomological studies; and that we may thus show our gratitude to the donor.

ARACHNIDA.

In 1882, as in previous years, some energetic collectors were found prepared to sweep the heather and beat the bushes in search of spiders. At one time nearly one hundred collectors were at work, and some thousands of specimens were obtained. These have at present been only imperfectly examined, but it is expected that the Society's collections will be enriched by five or six new species.

The prize for most assiduous devotion to this part of the Society's work was awarded to G. D. Apthorp. *Proxime accesserunt* Hon. V. R. B. Wilbraham and C. H. Meares.

ZOOLOGICAL REPORT.

In consequence of the mild winter and the early spring the birds on the whole appeared sooner this year.

There are no new species to record. Blackbirds, thrushes and larks—especially the latter—seem to have suffered from the cold winter of 1880-81 and were fewer in number; chaffinches and magpies however were more numerous than usual.

Another specimen of the Smooth-crowned snake—Coronella lævis—was killed near the College by J. Arkwright. This snake is by no means common in England and was first discovered at Sandhurst some twelve or fifteen years ago.

The adder, the grass snake and the slow-worm were all taken in the neighbourhood.

Specimens of two birds—Ardea Pacifica and Ardea Novæ Hollandæ—have been presented to the Society by F. D. Ringrose (O.W.) by whom they were shot in Australia.

Our collection has also been considerably enriched by a very valuable addition of about 130 eggs of British Birds, presented by B. T. Pell, among which are those of the Little ringed Plover, Montague's Harrier, Black Redstart, Woodchat's Shrike, Dartford Warbler, and the Crane.

F. H. GREEN-WILKINSON,

Zoological Album Keeper.

METEOROLOGICAL REPORT.

A considerable sum has been expended by the Society during the year in replacing some and verifying nearly all the instruments in use.

On March 24th, a new, properly constructed and verified pair of wet and dry bulb thermometers were obtained. The water receptacle on the old instrument was so placed that the readings of the wet bulb thermometer were worthless, and as neither of the thermometers was graduated on the stem the readings could not pretend to any degree of accuracy. The next day a verified rain gauge was set up a few yards from the old one, the latter from its proximity to the thermometer-stand was partially sheltered and the thickness of the rim of the funnel produced a perceptible amount of in-splashing. The two gauges were read simultaneously (except during the Easter holidays) until the middle of September, during this period the old gauge collected 9·31 inches, the new one 8·78 inches, shewing that the gain from in-splashing in the former more than counterbalanced the loss due to its sheltered position. The amounts collected by the old gauge before March the 25th have been reduced in the ratio of the amounts given above and are entered as "Corrected Rainfall."

The Solar Maximum Thermometer—a black bulb in vacuo—was broken on May 19th, and was replaced on July 6th by a verified thermometer of similar construction, the original thermometer had not been verified and its errors therefore were not known.

The Maximum and Minimum thermometers were sent to Kew for verification during the Summer holidays, the readings taken during the early part of the year have all been corrected in accordance with the errors then found, these were large in some cases amounting to more than half a degree.

The remaining instruments were left under the charge of a gardener who had read them during the previous Christmas and Easter holidays; he took the readings until Aug. 10th, when he suddenly disappeared without giving any notice of his intention, the instruments were therefore untouched until September 14th, when the amount of rain collected was found to be 2·22 inches in the new gauge and 2·35 in the old gauge. The solar maximum thermometer read 129·6.

Immediately after our return the board on which the thermometers had previously been exposed was replaced by a Stevenson's cage thus giving the thermometers the exposure required by the Meteorological Society and for the first time rendering our observations comparable with those made at the Society's stations. The removal of the board considerably affected the exposure of the old rain gauge and the readings of this instrument were discontinued.

Towards the end of the month the instruments were inspected by Mr. Marriott, Assistant Secretary to the Meteorological Society, and the observations for the last quarter of the year have been regularly sent to the Society.

The only instrument now in use which has not been properly verified is the barometer, this is not a standard instrument and from its construction cannot be made to give readings of the accuracy demanded in the present state of Meteorological Science, this however does not affect its value as a "weather glass."

The space round the thermometer screen has been trenched and sewn with grass in order that the radiation received from the ground may be the same, under the same atmospheric conditions, as at other stations.

The rainfall observations for the year have been sent to Mr. G. J. Symons, F.R.S., for insertion in his annual tables of British rainfall. The heaviest rainfall, for a short period, during the year was on the afternoon of June 3rd; the rain commenced between 4.45 and 4.50 p.m. and continued until about 5.35 thus lasting from 45 to 50 minutes; immediately after the fall ·67 in. was found in the gauge, as scarcely any had fallen previously during the day, at least ·65 in. must have fallen during the time mentioned.

The "Dew Point" and "Relative humidity" have been calculated from the readings of the Dry and Wet Bulb thermometers by means of the Meteorological Society's tables. The former is the temperature to which a surface must be brought in order that dew or moisture may be deposited on it by the atmosphere, the latter expresses the amount of aqueous vapour in the air supposing the greatest amount it is capable of holding at the time to be represented by 100.

The observations have been taken at 9 A.M.

JANUARY.

Date	Barom. Reduced.	Thermometers.				Rain.
		Max.	Min.	Solar Max.	Dry Bulb	
	In.	°	°	°	°	In.
1	29·83	45	37	50	40	·16
2	·76	46	34	54	43	·29
3	·25		40	55	45	·03
4	·84	49	31	58	32	·16
5	·69	51	32	55	47	
6	·69	50	41	57	50	·04
7	29·82	41	36	65	36	·34
8	30·23	40	35	58	39	
9	·05	41	36	60	36	
10	·41	37	32	56	33	
11	·16	46	34	55	46	·03
12	·35	44	42	51	44	
13	·42	41	39	50	41	
14	·50	40	39	44	40	
15	·60	44	36	46	37	
16	·79	42	36	43	42	
17	·85	31	30	38	31	
18	·88	33	28	37	30	
19	·84	38	29	38	32	
20	·69	36	32	41	36	
21	·66	40	30	60	32	
22	·57	35	28	50	34	
23	·50	38	25	38	31	·05
24	·66	43	25	78	33	
25	·68	47	22	52	31	
26			29			
27	·86	58		63	47	
28	·82	53	40	72	47	
29	·16	48	42	55	46	·20
30	·27	43	37	47	43	
31	30·59	44	38	58	44	
Mean	30·31	43	34	53	39	Total 1·30

Corrected rain fall 1·23 inches.

FEBRUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb	Rain.
	In.	°	°	°	°	In.
1	30·61	43	27	80	32	
2	·48	46	19	68	31	
3	·41	43	29	60	32	
4	·44	53	23	82	27	
5	·51	47	25	53		
6	·46	43	30	53		
7	·49	40	32	53	40	
8	·50	43	33	49	36	
9	·36	48·1	34	52	36	
10	30·11	46·0	35·1	81	38·4	
11	29·93	51·6	35·6	86	43·6	
12	29·85	58·2	43·2	102	50·0	
13	30·02	49·7	39·5	53	52·1	
14	30·19	55·4	37·8	98	49·5	
15	29·81	51·4	40·6	61·5	49·9	·31
16	30·38	48·8	29·9	69·8	37·9	
17	·27	51·6	31·4	82·4	42·0	
18	·27	52·6	39·0	83·3	47·7	
19	·57	47·8	33·7	90·8	41·5	
20	·79	58·5	28·4	82·0	36·9	·02
21	·60	51·9	31·3	61·9	50·9	
22	·64	50·0	42·6	59·7	45·1	
23	·35	54·5	41·7		43·0	
24	30·16	50·2	37·3	91·0	41·9	
25	29·83	52·2	39·2	69·8	49·0	·36
26	·16	55·6	49·0	70·1	51·0	
27	·11	52·2	43·0	72·6	49·1	·22
28	29·56	50·5	41·1	82·0	48·9	·47
Mean	30·21	49·8	34·7	72·1	42·4	1·38

Corrected rainfall 1·30 inches.

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb	Wet Bulb.	Dew Point.	Relative Humidity.	Rain.
	In.	°	°	°	°	°	°	°/o	In.
1	28·97	51·7	42·8	102·1	45·0				·12
2	29·39	49·7	39·9	99·9	45·5				·04
3	·35	52·0	30·8	98·0	42·8				
4	·56	51·8	25·0	90·0	33·1				
5	·79	52·2	31·7	105·8	46·0				
6	29·78	49·2	43·7	95·9	45·0				
7	30·22	55·6	31·4	69·4	46·1				
8	·23	55·8	41·0	71·4	44·6				
9	·34	53·7	42·3	80·9	50·4				
10	·32	54·5	47·7	62·6	50·8				
11	·45	59·5	46·8	92·8	51·5				
12	·52	55·4	36·6	107·2	46·1				
13	·56	59·6	29·5	105·4	41·0				
14	·51	59·7	30·1	106·5	42·1				
15	·48	60·6	29·8	109·8	41·5				
16	·65	62·2	32·3	107·6	46·6				
17	·56	63·6	30·9	110·9	43·0				
18	·33	69·6	29·5	110·5	45·9				
19	30·12	59·0	32·9	105·0	43·8				
20	29·82	62·3	35·2	107·8	42·1				
21	·76	49·4	31·4	101·9	44·2				
22	·93	50·5	28·6	100·9	54·0				
23	·89	58·2	25·9	99·4	38·0				·05
24	·83	56·5	28·7	96·0	50·0				
25	·77	54·7	31·2	120·1	46·4	42·6	38·2	74	
26	29·32	49·4	32·2	96·0	42·4	37·7	31·9	67	·51
27	30·09	52·5	34·3	105·0	48·7	43·2	37·2	65	
28	·20	57·6	39·5	101·0	47·7	44·8	41·6	80	
29	30·03	55·8	47·3	81·2	51·8	49·1	46·3	82	
30	29·69	57·6	39·9	111·0	49·6	45·2	40·6	72	
31	29·55	50·1	32·0	113·2	47·6	42·0	35·8	64	
Mean	30·00	55·8	34·8	98·9	45·6				Total ·72

Corrected rain fall ·71 inches.

APRIL.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb	Wet Bulb.	Dew Point.	Relative Humidity.	Rain.
	In.	°	°	°	°	°	°	°/°	In.
1	29·72	62·4	40·2	102·1	49.0	45·7	42·2	78	·03
2	·83	62·6	42·3	108·8	50·8	47·9	44·9	81	
3	29·90	59·2	44·4	105·0	47·3	45·9	44·4	90	
4	30·02	56	42·2	135	50·8	45·7	40·4	68	
5	·05	50	38	100	48	44			
6	·19	57	30	101	43	43			
7	·27	57	34	102	45	42			
8	30·33		35		49	46			
9		59		114					
10			28						
11	29·95	59		108	42	40			
12	·80	58	34	104	49	47			·22
13	·43	54	45	95	48	48			·39
14	·29	58	43	114	51	48			·04
15	·35	61	35	118	47	47			
16	·76	55	26	100	41	38			·05
17	·45	56	40	88	49	49			·09
18	29·67	55	44	113	48	45			·08
19	30·02	56	40	78	51	50			·03
20	29·99	63	49	113	54	50			
21	30·24	65	33	115	53	49			·05
22	29·72	57	49	94	50	50			·48
23	·22	58	47	113	50	50			·08
24	·52	57	44	109	50	49			·11
25	·48	52	37	77	51	46			·78
26	·31	52	34	97	44	41			
27	·75	53	31	102	46	40			·41
28	·25	55	38	111	45	45			·11
29	·46	53	35	89	46	43			·28
30	29·73	56	34	109	45	40			·08
Mean	29·74	57·0	38·3	104·1	48·0	45·5			Total 3·26

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Rain.
	In.	°	°	°	°	°	°	°/o	In.
1	29·69	58	39	110	49	46			·06
2	·90	60	41	110	53	49			
3	·81	70	44	117	50	50			·06
4	·68	61	45	100	50	50			
5	·82	66·2	43	116·9	49	49			·85
6		60·2	41·6	120·9	51·7	49·7	47·7	86	
7	29·96	67·2	39·0	118·9	58·9	53·0	47·8	67	
8	30·00	60·7	35·3	118·0	52·9	48·4	43·9	72	
9	·40	61·9	38·3	107·0	50·4	43·7	36·6	60	·08
10	·37	59·9	47·9	119·1	54·5	52·7	50·9	87	
11	·35	69·6	49·5	106·1	62·8	57·9	53·7	73	
12	·24	59·6	46·6	111·2	54·9	51·4	48·0	78	
13	·35	67·2	34·1	113·5					
14	·33	59·9	37·1	114·9	54·0	48·9	43·9	69	
15	·23	55·4	36·4	110·3	46·9	43·8	40·3	79	
16	·37	59·9	34·2	112·8	53·1	46·9	40·7	63	
17	·47	61·2	31·4	121·1	51·4	48·0	44·5	78	
18	·40	65·1	33·4		54·7	50·1	45·7	72	
19	30·22	69·0	36·4		61·4	56·9	52·9	75	
20	29·89	63·3	43·2		58·9	55·8	53·0	81	
21	·88	73·1	39·4		59·9	57·8	55·9	88	·05
22	·89	73·5	40·1		64·7	61·8	59·4	83	
23	·64	72·6	46·3		63·8	55·9	49·4	59	
24	·58	64·2	48·8		59·9	57·2	54·8	84	·03
25	·49	64·5	49·6		53·7	52·0	50·3	88	·65
26	29·78	59·8	50·5		58·1	55·4	53·0	83	
27	30·01	64·9	49·4		60·8	57·9	55·4	83	
28	·17	69·8	45·2		66·1	62·1	58·9	78	
29	·32	71·8	46·3		62·1	57·5	53·6	74	
30	·30	68·5	42·8		55·8	53·7	51·7	87	
31	30·33	67·5	41·7		57·0	55·3	53·8	89	
Mean	30·06	64·6	41·8		56·7	52·6	49·8	77	Total 1·78

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Rain.
	In.	°	°	°	°	°	°/o	In.
1	30·34	66·2	41·3	54·9	51·0	47·3	75	
2	30·15	64·2	47·0	57·9	56·2	54·7	89	·03
3	29.89	69·8	46·3	62·4	59·1	56·3	81	·89
4	·74	67·7	45·2	59·9				·10
5	·81	64·5	46·6	56·8	54·7	52·8	87	·18
6	·71	64·8	53·6	56·0	56·0	56·0	100	·04
7	·75	65·9	48·7	60·0	55·0	50·6	71	·03
8	·91	61·5	45·2	56·9	54·9	53·1	87	·41
9	·49	63·5	41·7	49·5	49·5	49·5	100	·18
10	29·59	60·7	46·9	56·2	54·8	53·5	91	·02
11	30·04	62·2	44·1	54·0	51·8	49·6	85	·01
12	29·82	67·3	45·2	53·9	51·7	49·5	85	·07
13	30·00	57·6	38·8	49·9	47·0	43·9	81	·18
14	29·88	61·8	47·1	57·5	57·5	57·5	100	·02
15	30·23	63·2	47·5	53·6	52·7	51·8	94	
16	·22	68·1	35·1	58·1	57·9	57·7	99	
17	30·06	65·8	36·6	54·1	52·5	50·9	89	·08
18	29·74	63·8	49·4	54·3	53·9	53·5	97	·11
19	·79	64·0	46·2	54·9	52·8	50·8	86	·02
20	·89	70·1	45·6	60·7	57·5	54·7	81	
21	·89	64·2	45·2	60·0	59·5	59·0	97	·16
22	·81	61·5	54·6	57·6	57·6	57·6	100	·31
23	·88	64·3	44·0	58·0	54·8	51·9	80	
24	29·97	67·7	42·0	63·8	60·1	57·0	79	·33
25	30·02	68·0	53·0	62·9	59·9	57·3	82	·04
26	·01	70·8	48·2	60·1	59·0	57·1	94	·04
27	·12	64·5	44·6	63·0	56·1	50·2	63	
28	·20	71·2	51·1	66·0	60·1	55·3	69	
29	·21	69·7	54·2	69·0	63·1	58·5	69	·07
30	30·04	64·8	49·7	60·0	57·4	55·1	84	
Mean	29·94	65·3	48·1	58·1	55·7	53·5	85	Total 3·32

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Rain.
	In.	°	°	°	°	°	°	°/o	In.
1	30·12	73·3	43·3		61·0	58·9	57·1	88	
2	·14	72·9	53·4		67·1	64·2	61·9	84	
3	30·17	70·5	55·5		69·9	64·8	60·8	73	
4	29·79	67·6	55·1		59·9	57·1	54·7	83	·11
5	·57	64·6	53·6		62.5	58·5	55·1	77	·20
6	·55	63·3	51·8	92·6	62·0	57·5	53·6	75	
7	·41	65·5	49·6	100·6	58·0	55·0	52·8	81	
8	·53	67·7	47·1	116·2	63·0	57·8	53·3	66	
9	·65	67·5	49·0	100·2	66·9	57·2	49·4	54	
10	·77	65·8	46·0	119·3	61·2	54·0	47·7	61	
11	·72	64·8	50·0	106·6	63·2	61·6	60·2	90	·45
12	·80	68·7	49·5	119·5	61·9	56·0	50·9	68	·04
13	·91	67·3	53·0	119·0	59·5	57·9	56·5	90	·05
14	·68	67·0	50·9	119·8	60·1	57·8	55·8	87	·10
15	·52	68·2	58·6	89·3	65·2	63·0	61·2	87	·08
16	·63	69·9	52·5	125·1	62·5	57·6	53·4	73	·19
17	·87	64·2	53·2	125·5	65·9	58·7	52·8	63	
18	29·91	66·7	55·0	117·0	63·2	57·9	53·4	71	
19	30·07	69·9	51·1	113·1	64·1	57·2	51·5	64	
20	·21	66·1	47·2	123·0	64·9				
21	30·06	66·9	46·9	124·6	61·5	57·2	53·5	76	·05
22	29·87	65·6	55·6	92·8	58·2	57·6	57·1	96	·09
23	·63	64·9	51·1	117·7	56·8	56·1	55·5	95	
24	·76	66·2	50·1	117·6	64·0	58·5	53·9	70	·40
25	29·87	68·7	49·0	116·3	56·1	54·2	52·4	88	·04
26	30·25		48·3	119	60·6	54·9	49·9	68	
27	·34			124	67	61			·03
28	·37			95	63	59			
29	·39			} 125	64	61			} ·06
30									
31	30·35			123	59	53			
Mean	29·90	67·4	51·0	113·7	62·4	58·1	54·6	77	Total 1·89

D. H. BARKER,

Meteorological Album Keeper.

AUGUST.

Date	Barom. Reduced.	Thermometers. Solar Max.	Dry Bulb.	Wet Bulb.
	In.	°	°	°
1	30·23	117	65	61
2	·15	120	71	71
3	·23	127	55	55
4	·34	115	58	58
5	·29	118	61	61
6	·22	137	57	56
7	·22	126	63	63
8	·22	122	61	61
9	·24	117	58	58
10	30·25		58	58

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Rain.
	In.	°	°	°	°	°	°	°	In.
14	30·60	53·1		110·0					
15	29·73	53·2	33·0	109·2					
16	·92	64·7	36·1	107·5	51·3	48·8	46·2	83	·02
17	29·94	63·7	37·2	95·6	58·5	54·7	51·3	77	
18	30·00	55·5	44·7	113·0	51·9	47·4	42·8	72	·08
19	29·92	57·4	40·0	66·6	48·0	47·0	45·9	93	1·00
20	·66	59·9	47·9	90·2	56·9	56·5	56·1	97	·04
21	·77	60·9	43·4	96·0	56·5	54·5	52·6	87	·01
22	·85	61·8	46·4	114·7	54·8	51·8	48·9	80	
23	·98	62·0	43·2	107·0	52·0	50·2	48·4	87	
24	·98	63·7	50·2	108·4	53·4	52·1	50·8	91	
25	·83	65·4	50·0	114·0	58·7	55·6	52·8	81	
26	·47	61·2	48·9	105·9	56·1	53·2	50·5	82	·01
27	·23	57·6	41·9	96·8	52·6	51·4	50·2	92	·01
28	·66	59·8	42·8	113·3	50·6	46·4	42·0	73	·83
29	29·34	55·3	47·1	84·2	52·0	51·0	50·0	93	·01
30	29·91	61·7	43·2	75·2	48·9	48·1	47·2	94	·01
Mean for 15 days	29·76	60·7	43.7	99·2	53·5	51·2	49·0	85	Total 2·02

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.
	In.	°	°	°	°	°	°	%	0—10	In.
1	29·88	67·2	48·7	106·2	61·4	59·4	57·7	88	8	·08
2	30·04	62 7	42·7	109·1	57·9	54·3	51·1	78	2	·22
3	·18	60·2	46·2	106·3	52·9	50·6	48·3	85	1	
4	·35	56·0	40·4	88·6	50·9	49·0	47.0	87	9	·01
5	·34	58·2	43·4	102·3	51·9	50·6	49·3	91	5	·03
6	·15	60·7	52·1	83·2	54·9	52·3	49·8	82	10	·12
7	·05	63·3	50·0	106·3	53·2	52·0	50·8	92	4	
8	·09	58·3	41·7	104·6	49·9	49·6	49·3	98	10	
9	·14	61·0	44·2	109·8	52·9	53·0	52·9	100	10	
10	30·08	67·0	43·9	76·2	49·9	50·0	49·9	100	10	·09
11	29·77	59·0	49·7	67·1	57·0	56·6	56·2	97	10	·20
12	·59	55·8	44·3	94·2	46·9	47·0	46·9	100	4	
13	·74	60·1	43·7	96·1	46·6	46·5	46·4	99	10	·02
14	·93	60·0	41·3	80·0	52·9	51·5	50·1	90	10	
15	·93	55·8	37·4	63·5	47·6	45·5	43·2	86	10	·83
16	·64	52·4	37·5	56·5	46·9	45·8	44·6	92	10	·52
17	29·73	49·6	45·8	52·5	46·7	46·4	46·1	98	10	·05
18	30·09	54·9	42·2	96·1	43·9	43·5	43·0	97	10	·02
19	29·86	54·8	43·3	64·6	53·4	52·0	50·6	90	10	·18
20	·79	59·5	41·7	102·7	44·0	44·4	44·0	100	4	·42
21	·52	56·7	44·2	82·3	53·0	53·0	53·0	100	10	·45
22	·24	54·5	45·3	93·7	49·1	48·1	47·0	93	9	·25
23	29·49	54·9	39·1	94·2	46·6	43·4	39·8	78	1	·80
24	28·98	55·6	40·3	93·0	52·4	52·0	51·6	97	10	·18
25	29·52	52·9	36·7	86·2	43·5	42·0	40·2	88	8	·01
26	·52	53·0	28·8	96·1	40·9	40·1	39·1	94	4	·22
27	·36	57·1	40·3	55·6	44·3	43·9	43·4	97	10	·71
28	·43	48·9	44·2	54·0	46·9	45·6	44·2	91	10	·31
29	·74	48·5	40·1	89·2	42·0	39·3	36·0	79	0	·02
30	·85	53·2	32·8	61·8	45·4	44·4	43·2	92	10	·26
31	29·99	55·9	41·2	96·8	45·6	44·7	43·7	93	1	·01
Mean	29·81	57·0	42·4	86·1	49·4	48·3	47·0	92	7·4	Total 6·01

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.
	In.	°	°	°	°	°	°	°/o	0—10	In.
1	29·65	56·6	45·3	88·2	51·3	49·3	47·2	86	10	·06
2	·80	55·9	46·0	84·2	55·1	49·1	43·3	65	6	·13
3	·83	56·1	48·2	96·3	50·4	47·8	45·0	82	0	·11
4	·66	55·4	48·3	96·1	53·0	47·1	41·2	65	9	·01
5	29·95	59·2	46·3	79·1	53·8	52·1	50·4	88	10	·03
6	30·10	55·1	41·8	94·4	47·0	45·1	43·0	87	4	·49
7	29·83	50·2	41·9	71·8	43·0	41·2	39·0	86	10	·23
8	·48	49·6	39·1	89·3	44·2	40·5	36·2	74	5	·01
9	·24	51·1	38·3	87·2	43·9	39·9	35·2	72	1	
10	·65	55·7	35·0	95·6	40·7	39·1	37·1	87	0	·02
11	29·65	46·0	36·8	90·5	38·3	37·1	35·4	89	4	
12	30·02	44·0	25·6	73·8	29·0	29·0	29·0	100	4	·19
13	29·90	44·5	28·1	51·5	39·4	38·7	37·8	94	10	·02
14	·87	38·0	36·7	41·1	38·0	35·1	31·1	76	10	
15	·78	41·1	31·9	81·5	35·0	33·7	31·6	87	9	·42
16	·13	39·1	31·5	41·3	33·0	32·8	32·4	97	10	·11
17	·85	40·8	31·5	72·5	35·6	33·8	31·0	84	9	
18	·95	49·0	21·0	71·0	30·0	29·6	28·3	93	6	·12
19	·54	47·8	28·5	86·2	42·1	39·3	35·8	78	4	·07
20	·37	41·0	35·0	75·1	38·7	36·9	34·6	85	3	
21	·76	49·8	31·3	69·8	34·0	33·4	32·3	93	0	·19
22	·60	53·2	33·0	92·3	49·3	48·0	46·6	91	10	·01
23	·60	55·0	49·4	64·8	52·0	49·8	47·6	85	10	·15
24	·27	52·8	41·1	94·5	46·8	46·0	45·1	80	8	
25	·30	46·8	37·9	83·0	40·1	39·6	39·0	96	5	03
26	·33	47·7	38·6	81·3	40·1	38·7	36·9	89	0	
27	·83	44.8	35·0	83·2	37·9	35·2	31·5	78	0	·02
28	·99	39·8	34·1	71.0	38·3	35·1	30·7	74	0	·31
29	29·71	45·5	29·5	61·3	43·2	42·3	41·2	93	10	·14
30	30·03	42·8	38·6	70·0	39·7	38·1	36·0	87	10	
Mean	29·69	48·5	36·8	77·9	42·1	40·1	37·7	85	5·9	Total 2·87

Snow commenced early on the 16th, a great part of the fall is therefore registered to the 15th.

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.
	In.	°	°	°	°	°	°	°/°	0—10	In.
1	29·89	34·7	23·8	59·3	30·1	30·0	29·7	98	5	
2	30·02	43·0	24·0	43·4	26·1	26·0	25·5	97	10	·04
3	29·53	50·5	25·3	79·3	42·4	42·3	42·2	99	10	·10
4	·09	45·3	39·2	86·0	40·4	38·7	36·5	87	1	·01
5	·05	37·3	32·7	46·5	33·9	32·0	28·7	80	6	·03
6	·21	33·5	32·4	49·1	32·9	31·7	29·3	85	10	·02
7	·11	34·0	26·9	40·6	29·0	27·8	23·5	78	10	·44
8	·25	34·6	28·4	59·5	33·9	33·4	32·5	94	10	
9	·62	37·6	32·4	76·6	34·0	33·0	31·2	89	9	
10	·70	25·2	19·1	53·1	20·0	20·1	20·0	100	8	
11	·68	29·7	18·6	36·1	20·0	20·0	20·0	100	10	
12	·64	38·1	14·0	39·5	29·7	29·5	28·9	96	10	·03
13	·48	44·4	29·0	73·1	37·9	37·6	37·2	97	10	·01
14	·67	36·7	35·3	39·0	35·9	35·9	35·9	100	10	·01
15	·81	47·8	32·6	43·1	34·7	34·6	34·4	99	10	·03
16	·87	47·0	35·3	46·7	42·1	42·0	41·9	99	10	·07
17	·85	47·8	45·7	52·2	46·1	45·9	45·7	99	10	·09
18	·59	47·7	43·7	59·2	47·1	47·1	47·1	100	10	·01
19	29·87	49·5	37·9	61·7	45·0	43·9	42·6	92	8	
20	30·28	47·9	32·6	50·4	34·3	34·1	33·7	98	5	·09
21	29·91	44·9	33·8	81·3	44·9	43·2	41·2	87	7	
22	·80	44·7	36·0	78·1	35·1	34·9	34·6	98	3	·15
23	·55	42·7	35·9	79·7	38·1	35·5	32·0	78	4	
24	·89	46·8	30·6	75·3	32·1	31·5	30·1	92	3	·08
25	·58	52·6	31·0	52·5	46·9	46·6	46·3	98	10	·30
26	·40	53·4	46·6	77·3	50·1	49·5	48·9	96	10	·14
27	·59	55·6	48·1	90·6	53·2	53·0	52·8	99	10	·13
28	·79	53·3	52·0	88·2	52·3	50·7	49·1	89	10	·01
29	·59	52·8	42·9	89·1	50·6	49·7	48·8	94	10	·19
30	29·70	52·9	47·1	60·8	49·9	49·7	49·5	99	10	·20
31	30·21	54·1	41·2	61·9	49·2	49·4	49·2	100	10	·28
Mean	29·65	44·1	34·0	62·2	38·6	38·0	37·1	94	8·4	Total 2·46

Corrected rainfall for the year 29·09 inches.

Snow fell on the 5th, 6th and 7th.

J. M. COODE,

Meteorological Album Keeper.

ETHNOLOGICAL REPORT.

The following coins were kindly presented to the Society last year by Mrs. Wetherall of Finchampstead.

Silver pennies of Edward I.

Struck at

5 *London.* EDWAR. R. ANGL. DNS. H.Y.B.
Reverse. Civitas London.

1 *Newcastle.* EDWARD. R. ANGL. DNS. HYB.
Reverse. Vill. Novicastri.

4 *Canterbury.* EDW. R. ANGL. DNS. HYB.
Reverse. Civitas Cantor.

1 *Bristol.* EDW. R. ANGL. DNS. HYB.
Reverse. Vill. Bristolie.

11 *Durham.* EDW. R. ANGL. DNS. HYB.
Reverse. Civitas Dureme.

Of the remainder

1 is a bronze coin of Ceylon,

1	,,	Chili,
1	,,	Duc de Neuchatel, 1808,
4	,,	East India Co.,
4	copper	do.,

1 nickel Arabic,

1 silver 50 cent. piece of Louis Philippe I.

T. C. PAKENHAM,

Ethnological Album Keeper.

FOURTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1883.

"*Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης.*"
'Επιστολὴ πρὸς 'Ρωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1884.

FOURTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1883.

VIRTUTIS FORTUNA COMES

"*Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης.*"

Ἐπιστολὴ πρὸς Ῥωμαίους, *I.* 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1884.

Contents.

PREFACE.

THE work of the Society has been carried on steadily during the year although there are no very important discoveries to record. The Phenological observations have been made with more success than last year but the list of flowers observed is still anything but complete.

In the Entomological section the only observations worthy of special note are those of Mr. Blandford who spent three days with us in June. Mr. Blanford writes "the district is one of best I ever visited, and should stimulate your boys to collect."

The lists of the Flora and Lepidoptora of the neighbourhood have been published in a separate form for the use of observers. Several corrections being necessary in the list of Lepidoptra a second edition is being brought out.

The Meterological Report is the most complete we have ever been able to present, and the observations have already proved of some value.

Our thanks are due to several of our Corresponding Members and others who have been good enough to lecture to us during the year, whilst among the donations received a valuable collection of shells given by R. T. R. Lawrence Esq. (O.W.) deserves to be specially noticed.

RULES.

1. That this Society be called the "WELLINGTON COLLEGE NATURAL SCIENCE SOCIETY.

2. That the Society consist of Honorary Members, Corresponding Members, Members, and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary, and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of Management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Associates elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

OFFICERS.

President—S. A. SAUNDER, Esq.

Vice-Presidents—Rev. C. W. PENNY, Rev. P. H. KEMPTHORNE, Rev. W. GOODCHILD.

Secretary { R. R. OTTLEY. H. B. HOPGOOD. | Treasurer { C. T. LAVIE. N. C. MACLEOD.

ALBUM KEEPERS.

Ethnological { T. C. PAKENHAM. F. G. MACKENZIE.

Geological { B. L. SCLATER. G. WALTER.

Botanical — { B. L. SCLATER. A. SPENCER-WELLS.

Zoological—F. H. GREEN-WILKINSON.

Meteorological—A. D. W. POLLOCK.

Entomological—J. C. INGLIS.

CORRESPONDING MEMBERS.

The ARCHBISHOP OF CANTERBURY.

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Very Rev. E. SPOONER.
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P. H. CARPENTER, Esq.
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A. I. CALAIS, Esq.
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G. P. T. FEILDING
A. STANLEY
L. W. McMAHON
W. F. ACLAND-HOOD
H. T. CHILCOTT

* Left Lent, 1883. † Left Midsummer, 1883. ‡ Left Christmas, 1883.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College	...	N.H.S.
Cheltenham "	...	N.H.S.
*Marlborough "	...	N.H.S.
Clifton "	...	N.H.S.
*Rugby School	...	N.H.S.
*Dulwich College ...	...	N.H.S.
*Haileybury " ...	...	N.H.S.
*King Edward's School, Birmingham		N.H.S.

*U. S. Geological Survey.

*Birmingham Nat. Hist. and Microscopical Society.

Linnæan Society.

Royal Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	4	9	7
Subscriptions:			
Lent Term—Honorary Members ...	1	16	6
,, ,, Members and Associates...	4	14	6
Easter Term—Honorary Members ...	1	8	0
,, ,, Members and Associates	4	11	6
Michaelmas Term—Honorary Members	1	9	6
,, ,, Members and Associates	4	12	6
Grant from the Master	5	0	0
Sale of Report	10	2	6
Sale of Catalogues...	1	12	6
	£39	17	1

Examined and found correct, S. A. SAUNDER.
Dec. 17, 1888.

Expenditure.

	£	s.	d.
Daily Weather Charts		5	0
New apparatus for Lectures	10	18	6
New cells and acid for battery	2	19	8
Carbons and repairs to lamp		9	6
Refilling gas jars		15	0
Squires, for charging battery		5	0
Perkins, for reading thermometers during holidays	1	0	0
Hire of slides		11	10
Carriage of parcels	1	19	6
Stamps		12	6
Locks and Keys for cabinets	1	1	0
Bishop, for printing Report and Catalogues	15	8	2
Burt, for stuffing birds...	1	1	9
Camphor and muslin for cabinets ...		2	0
Blank thermometer charts		2	9
Balance in hand	2	4	11
	£39	17	1

N. C. MACLEOD, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 3rd.

The Rev. E. DAVENPORT read a paper on "British Birds, especially the Lark and the Thrush."

Mr. Davenport's paper was intended to give the simplest information on a few ordinary birds and to show what interest can be found in the habits of the commonest birds. For this purpose Mr. Davenport chose for his special subject the Lark and the Thrush. One special object of the paper was also to invite the attention of observers to the time of the arrival of birds and their first song. And with this purpose in view, Mr. Davenport read a list of birds and the usual time of their arrival and first song, given him by the President of the Society. He also added to that list the furze-chat and fern-owl, two birds more or less peculiar to the immediate neighbourhood of Wellington College. The paper described the furze-chat as a pretty little indigenous bird which shows a preference for localities of a sterile and sandy nature such as are favourable to the growth of gorse. Its little body is carried by rounded wings from bush to bush. Its chief companions are the donkey and lapwing in the summer. It is described by Gould "as a very angry little bird—and is subject to great paroxysms of rage." Macgillivray says of it that "its nest is one of the hardest to find." Mr. Davenport also called attention to the species of Wag-tail which is so often to be seen in the evening during the spring in large flocks either on the drive in front of the College or on the lower part of the turf, near the well. From its appearance it did not seem quite to answer to the description of the yellow or water wag-tail.

The paper went on to speak of the Lark. The information given on this bird was chiefly gathered from Gould's book, and a book, especially recommended to lovers of birds, by the Rev. C. A. Johns. The Lark or Alauda Arvensis, is not only a

favourite with all writers on birds but also with our well known Poets. One or two extracts were quoted :

> **Lo here the gentle lark, weary of rest,**
> **From his moist cabinet mounts up on high**
> **And watches the morning from whose silver breast**
> **The Sun ariseth in his majesty.**

All that could be quoted from the Poets can only be an amplification of the golden lines

> **"Hark, the Lark at Heaven's gate sings."**

For a thorough appreciation of the Lark's song we should turn to the Life of a Scotch Naturalist, Thomas Edward. "Next to the Mavis, the Lark or Laverock" he says "is the bird for me and has been since I first learned to love the little warblers of the woods and fields. How oft, oh! how oft, has the lark's dewy couch been my bed, and its canopy, the high azure vault, been my only covering, while overtaken by night during my wanderings after nature; and oh! how sweet such nights are—and how short they seem—soothed as I have been to repose by the evening hymn of the lark and aroused by their early lays at the first blink of morn."

The lark is found all over the British Isles but is less numerous on the Western Isles and extreme North of Scotland, especially in winter. Larks may be seen in large flocks in the autumn. In winter the foreign larks return to the continent, the stay-at-home birds take up their quarters in arable and moor lands.

The habits of this bird are worthy of observation. By the conformation of its claws it is naturally adapted to perching on the ground, by its length and power of wing for soaring high in the air; it never perches on a tree. The following description of its flight is from Gould, "Rising as it were by a sudden impulse from its nest, it bursts forth while as yet a few feet from the ground into exuberant song, and with its head turned towards the breeze, now ascending perpendicularly, now veering to right or left, but not describing circles, it pours forth an unbroken chain of melody, until it has reached an elevation computed to be, at the most 1000 feet. To an observer on earth it has dwindled to the size of a mere speck, but it never rises so high as to defy the search of a keen eye." "Having reached its elevation" he says "its ambition is satisfied with a series of droppings with intervals of simple hovering, during which it seems to be resting on its wings. Finally, as it draws near the earth it ceases its song and descends more rapidly but before it touches the ground it recovers itself, sweeps away with almost horizontal flight for a short distance and disappears in the herbage." "In performing this evolution it has been known to take 15 to 20 minutes." It is remarkable as being the only bird

which sings in its flight. Perhaps, if we had never seen or heard one we could only suppose that those who said they had were "drawing upon their imagination." It ceases to sing in July and begins again in October. It begins its song at sunrise and has been heard in Cornwall as late as 11 o'clock at night. It sings in its cage hanging at the door of the poor man's cottage in the country or dark alley of some smoky town, with as much spirit as if its six inches of turf could be measured by acres, and the roof of its little cage were the vault of heaven.

To live in a country having such a charming accompaniment as the skylark should be a source of great happiness. The Americans regret its loss and the blank is felt in Australia, so much so that they have tried to import the bird into both countries—but "nature's law is strict and difficult to understand," and whenever the experiment has been tried it has failed. The birds, if their pinions have been strong enough have resought the country which nature taught them to love.

The thrush is a bird of no less interest to all Europeans. It is distributed all over Europe, as far North as Norway, and Cape Wrath in Scotland, and it has been seen in Galilee by Canon Tristram and in Tangiers and Eastern Morocco by an Old Wellingtonian named C. F. Tyrwhitt Drake. Macgillivray's account of the Thrush is perhaps the best. He says "it is associated in his memory with the Hebrides, where it is perhaps more abundant than in most parts of Britain. There in the calm summer evening when the sun is setting and shedding a broad glare of ruddy light over the smooth surface of the Ocean, when no sound comes over the ear save at intervals the faint murmur of the waves rushing into the caverns, the song of the thrush is poured forth from some granite rock and returns with softer and sweeter modulations from the sides of the heathy mountains. There may be wilder and more marvellous songs and the Mocking Bird may sing the requiem of the Red Indian of the Ohio or cheer the heart of the ruthless oppressor—the white man of many inventions; but to me it is all sufficient for it enters into the soul and melts the heart into tenderness. In other places the song of the Thrush may be lively and cheering; here in the Ocean girt solitude it is gentle and soothing." Its song is heard at all seasons, but especially in winter and summer, not only in sunshine but often in the midst of rain.

Its flight is very different to that of the Lark in its gentle curves and quick flaps. It is too well known to need description. Its ferocious appetite is a subject of interest. Its bill is very strong and it has been known to break large shells to get at its food. Macgillivray tells a story of how he heard in his rambles in Harris, a sharp "chink" like that of a small stone struck upon another, and standing still discovered at a distance—in a recess

formed by two flat stones at the upper part of the shore—a bird moving its head and body up and down, each downward motion being followed by the noise which had been so mysterious. Running up to the place, he found a thrush, which flying off left a whelk nearly broken, but with the animal in it, lying in the midst of a heap of fragments around a smooth stone. Having mentioned the subject to a scientific friend in Edinburgh, he was favoured with an answer of its utter impracticability.

Of its voracious appetite a story is told by a Mr. Weir in Macgillivray's Book, who hid himself in an old wall some 9 ft. from a Thrush's nest and watched it feeding its young. From his hiding place he watched them from 1 o'clock in the morning until 9 at night and in that time they fed their brood not less than two hundred and sixty times.

Gould's account of the Tenderie or Thrush catching in Belgium is too long to relate here. It is quoted by Gould to show that Thrushes migrate but the sport is of such an interesting character and such a favourite one with the people of the thickly populated towns in Belgium that he has related his account of it at great length, we must refer our readers who may be interested in this account to Gould's Book on Birds where they will find it.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Carr and carried unanimously.

Saturday, February 17th.

T. A. Rogers, Esq. read a paper entitled "Some experiments with the Polariscope."

If in the path of a parallel beam of light thrown from the lantern on the screen be interposed successively a rhomb of Iceland Spar, a plate of Tourmaline and an inclined plate of glass, and if these be turned about the direction of the beam as axis, the intensity of the spot of light undergoes no variations. So far then as these tests are concerned, a ray of light direct from the illuminating source is symmetrical all round. But if after passage through any one of these objects, the beam of light be similarly tested by a second, the intensity of the spot of light varies continuously with the relative positions of the interposed objects, the appearances of greatest and least brightness being found to be a quarter of a revolution apart. The beam of light therefore on passage through the first crystal or glass plate loses its symmetrical character. The double sideness of the ray in this state, from analogy to the two endedness of a magnet gave

rise to the term "polarisation." The unaided eye* cannot distinguish between ordinary and polarised light: two instruments are needed, one (the polariser) to produce the state and the other (the analyser) to exhibit it. Each of the rays produced, (i) both transmitted in the case of the rhomb of spar (ii) respectively transmitted and reflected in the case of the glass plate, is polarised and it is to be noted that as one member of the pair increases, the other diminishes in brightness.

The extent of polarisation may be roughly estimated by the more or less perfect extinction of light when analyser and polariser are crossed. As a means of producing polarisation, the inclined plate of glass is the least satisfactory for our purpose, the inclination of the plate requiring delicate adjustment. This difficulty is partially overcome by the use of a bundle of plates, wherein each plate by reflection or refraction increases the total amount of light polarised until the polarisation is nearly complete. Such a bundle is placed in the elbow of our polariscope. The rhomb of spar produces perfect polarisation, with moreover as little loss of light as may be: it is therefore of the greatest value, especially in the form of a Nicol's prism in which by cleaving the crystal at the proper angle and reuniting the parts by Canada balsam one of the two beams is diverted from the field. The Nicol is generally used as analyser unless both images are required; for such occasions we employ a double image prism carefully cut to give the greatest possible separation of the images, chromatic dispersion being corrected by a contrary prism of glass.

Premising a summary of the commonly received ideas of the nature of an undulation, we obtain the following explanation of the foregoing phenomena. Light is due to the rapid vibration of ether particles moving in closed curves in planes at right angles to the direction of the ray's path. In light coming directly from the illuminating source the circuits traversed by the particles may be of the greatest possible complexity consistent with the elastic nature of the ether. Polarisation consists in constraining the ether particles to move in paths which are similar and similarly situated. In particular if (as happens in the foregoing cases) the paths are limited to parallel straight lines, the ray is said to be plane or rectilinearly polarised; if to equal circles, circularly polarised; if to similar and similarly situated ellipses, elliptically polarised. In the preceding experiments, the analyser and polariser permit of vibrations of ether particles solely in directions parallel to straight lines fixed in themselves. The polariser from the nature of its own structure permits of vibrations parallel to one fixed straight line, of these vibrations only the resolved part parallel to the line of permitted

* Except by the appearance known as Haidinger's brushes.

vibrations in the analyser will reach the screen. The amount of light which will get through both will be greatest when the two are parallel, less when they are inclined to one another at less than a right angle, and nothing when they are at right angles or crossed.

If while the analyser and polariser are crossed, we interpose a slice of selenite or mica, light may be restored and the screen will generally be coloured. The particular tint produced is found to depend upon the thickness of the slice. Plates of uniform thickness show a single colour, uneven slices show variegated patterns of great beauty, while a wedge exhibits parallel bars of different colours. If the analyser be rotated, the patterns first vanish and then after a quarter of a revolution reappear in complementary tints. These tints may be shown to be complementary by using the double image prism as analyser with a uniform plate and making the two images overlap, when the overlapping parts will always be found to be white.

These chromatic effects are remarkably beautiful and may be indefinitely extended. Their explanation depends upon the principle of interference. Selenite and mica are doubly refracting and have the property of retarding the two rays unequally. The amount of retardation depending upon the thickness of the crystal will be the same for rays of all colours constituting white light but will be a different fraction of a wave-length for each and may be half a wave-length for some particular colour. On recomposition by the analyser of the divided beam, the laws of interference tell us that the ray of such a colour will be extinguished and the emergent beam be tinged with the assemblage of the remaining spectral colours. Further, simple geometrical considerations show us that the rays which are most nearly extinguished at one position of the analyser are most completely re-inforced in the position at right angles and *vice versa.* Hence the two colours exhibited by a given thickness of mica or selenite will be complementary.

Crystals owe their property of double refraction to unequal elasticity in different directions. Double refraction may consequently be artifically produced by pressure unequally distributed in glass, the region of stress being exhibited by the most beautiful and striking gradations of colour. The effects are fugitive with glass compressed by a screw and permanent with unannealed glass.

Quartz is a doubly refracting crystal, differing from mica and selenite in an important particular. A quartz crystal properly cut divides a ray into two, which are also unequally retarded, but impresses a circular motion on the particles of ether, the motion being oppositely directed in each. The resultant action on the succession of ether particles at a point of

the surface of the quartz of these two circular motions will be towards the centre. The emergent rays will therefore be plane polarised. The inclination of the line of vibrations to the vertical will depend on the amount of retardation of one ray behind the other in the crystal. Considerations similar to the previous ones show that the inclinations of the line of vibration to the vertical will be different for rays of different colours. The analyser on being rotated will therefore extinguish rays of different spectral colours in succession and the screen will accordingly exhibit a succession of colours complementary to those which are in turn extinguished. A quartz plate therefore at no position of the analyser gives either a dark or a colourless field and exhibits not two merely but the complete gradation of colours complementary to the distinguishable tints of the spectrum.

The lecture was illustrated by experiments with the Electric Light and a reflecting polariscope half the cost of which had been defrayed by Mr. Rogers.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne and carried unanimously.

Saturday, March 3rd.

The Rev. J. H. D. M. Matthews gave a lecture on "The site of Troy and the value of Dr. Schliemann's discoveries."

After some preliminary remarks on the Geography of the Troad which were illustrated by photographic slides, the respective claims of Hissarlik and Bunarbashi to be the site of Homer's Troy were discussed. Explanations were given of some of the principal objects discovered by Dr. Schliemann and of the extent to which his theories have been corrected by recent observations. Some illustrations were obtained for this part of the lecture by turning the lime-light on to sketches of various objects and throwing the reflected image on a screen by means of a lens: a method, which promises to be useful in cases where photographic slides cannot be obtained.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Davenport and carried unanimously.

Saturday, April 28th.

L. E. Upcott, Esq. gave a lecture on "The Greek Sculptor in the Temple and the Gymnasium."

The lecturer began by describing briefly the manner in which

the Greek temple assumed its most perfect shape. It consisted originally of an oblong cella, the eastern side of which was left entirely or partially open. The side walls were carried out a little way so as to project beyond the doorway, and when these were finished off in the shape of columns (antae), with two detached columns placed between them in the same line, there would be formed a sort of entrance or portico to the building. Subsequently four completely detached columns were placed both in the front and back, so as to form a double porch; this kind of temple was technically called *amphiprostyle*. Finally, when four more columns were added at the four corners and the two lines of columns united by pillars running parallel to the northern and southern sides, so that the temple was surrounded by a continuous colonnade, we have the so-called *peripteral* temple complete. In the more elaborate buildings there was often a double row of columns east and west.

In the best period of Greek architecture two styles were recognized; the Doric and the Ionic. In the former, the ends of the crossbeams supporting the roof were decorated with flutings; whence the stone slabs which were the survival of these were known as triglyphs: the intervening spaces, originally left open, were filled with slabs (metopes) often sculptured with figures in relief. This alternation of triglyphs and metopes was called the frieze, but the sculptures on it could not be continuous. In the Ionic system, the triglyphs disappear, and the frieze is a continuous flat surface like a band, running all round the building. In the Ionic frieze therefore the sculptures may be continuous, and the term frieze is sometimes confined to such a band of sculptured ornament, though strictly it is an architectural term.

In the Parthenon at Athens we have an example of both kinds of frieze; the exterior colonnade is ornamented by alternating triglyphs and metopes, while a continuous frieze is sculptured on the inner wall of the cella, forming, as it were, the upper fringe or border of the blank surface of the wall. (A cast of one of the metopes, representing a conflict between a Centaur and a Lapith, may be seen in the Upper Sixth Class Room.) The columns in the two styles differ markedly from each other; the Dorian column has no separate pedestal, and its capital is less elaborately finished than that of the Ionian style.

The cross beams do not rest upon the pillars themselves, but upon the stone blocks which connect them, and which form what is called the architrave. This with the frieze (or alternating triglyphs and metopes) and the cornice of the roof is called the entablature. The roof itself is sloping, and leaves thus a triangular space at each end enclosed between the gable-end and the cornice of the entablature: this is called the pediment, and a group of figures placed in such a space is called a pedimental composition.

The principle which guided the Greek sculptor was to ornament only those parts of the building which being not strictly 'carrying' parts admitted of its addition without being unduly weakened in appearance thereby. Such parts were the metopes, the frieze, and the pediment.

As an example of pedimental sculpture the lecturer took the well known "Aeginetan marbles." These were found in 1811 among the ruins of the temple of Athena at Aegina; they were subsequently restored by the Danish sculptor Thorwaldsen, and are now in the Museum at Munich. The sculptures, which were probably executed in the earlier part of the 5th century, B.C., represent the contest between the Greeks and Trojans for the body of Achilles. In this as in all pedimental sculptures, the triangular shape of the space to be filled influenced the artist in the arrangement of his figures; the central figures stand, those more remote kneel; the furthest from the centre are represented as lying. At the same time, the laws of his art have required him so far to depart from strict historical accuracy as to represent most of the figures nude instead of clothed in complete armour; the latter however he indicated by giving to each warrior some weapon, as a shield, a spear, or a bow. In other words he sacrificed, as all artists must often do, literal to artistic truth. The archaic nature of the work is shown by the stiff and conventional expression of the faces, while the limbs are executed with great care and fidelity: this being the order of development in the case of Greek art, in contrast to the earlier Italian school of painters, who learnt to paint expressive faces before they paid attention to the accurate delineation of the bodily frame.

As a specimen of a continuous frieze the famous 'frieze of the Parthenon' was next described. This represents the procession of the Panathenaic Festival at Athens, sculptured in relief on the outer wall of the 'cella' of the Parthenon, the temple of the Virgin Goddess Athena, which stood on the Akropolis at Athens. It was executed under the immediate superintendence of Pheidias (circ. 450. B.C.), the greatest of Greek sculptors, and is now to be seen in the Elgin room of the British Museum. The part of the frieze selected for study was the procession of horsemen from the N.W. corner of the temple. Its striking merit consists in the manner in which the artist, by close attention to detail and variety of treatment, has given to the whole work an appearance of vigorous life and movement which might have seemed to be incompatible with the conditions of his task. At the same time that inferiority of the faces to the rest of the work, which is so remarkable in the case of the Aeginetan marbles, is here no longer noticeable. The entire work, though much mutilated as we possess it, enables us to form an adequate idea of one of the noblest achievements of Greek art during its best period.

The laws of sculpture in relief were next discussed, the example chosen being the 'Orpheus Relief,' a slab representing the episode of Orpheus and Eurydike, described in the fourth Georgic of Virgil. This is now in the Naples Museum ; a slightly inferior copy is to be seen in the Louvre at Paris, while the Villa Albani at Rome contains a third. By contrasting the mode in which the poet and sculptor respectively treat the same subject in this instance, we learn something of the essential differences between poetry and sculpture which arise from the restrictions imposed upon each artist by the laws of his art. The sculptor selects for representation the critical moment of his episode, indicating by the gestures and position of his figures what the poet describes at length.

Passing to the second part of his subject, the lecturer described some of the most famous 'Athletic statues' of Greece. This branch of the art was fostered by the devotion of the Greeks to gymnastic exercises in the open air, and by the permission given to successful athletes in the great festivals to dedicate statues to commemorate their success. Of artists who devoted their attention to this branch of their subject, one of the best known is Myron, a contemporary of Pheidias, several copies of whose Diskobolos, or Quoit-Thrower, still remain. One is to be seen in the British Museum, though in this copy the head has been wrongly turned away from the hand which holds the quoit. A comparison of this with other Diskoboli by various artists illustrated the fundamental 'law of movement' in sculpture propounded by Lessing, that the sculptor selects for representation the moment immediately preceding or following the decisive action itself. Thus the Diskobolos of Myron represents the athlete in the attitude of 'preparatory balance' immediately preceding the casting of the discus, while another represents the thrower immediately after it has left his hands, watching eagerly the effect of his cast.

Pheidias and Myron were succeeded at Athens by Scopas and Praxiteles, who occupy the early part and the middle of the 4th Century, B.C. A rival school of sculpture (known as the Argive, in contradistinction to the Attic School) was founded in Argos, by Polykleitos, also a contemporary of Pheidias. His favourite representation was that of the human form at rest; while the Attic School preferred motion. He was considered to have brought this study to such perfection that one of his works was known as the Canon, as embodying the ideal type of the proportion of the whole and the various parts of the human frame. The lecturer chose his 'Doryphoros' or Spear-bearer as his example; the proportions of which he compared with the 'Apoxyomenos' of Lysippus his follower (a statue representing the athlete using the strigil after exercise) showing in what par-

ticulars the successor had made alterations in the admired proportions of his master's work. This latter statue was removed to Rome, where it appears to have been an especial favourite with the populace, who resisted an attempt on the part of Tiberius to appropriate it.

The lecture was illustrated by sketches in outline drawn by the lecturer on an enlarged scale from photographs of the original sculptures.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Matthews and carried unanimously.

The following presents were laid on the table:

A one cent piece of the new coinage for British North Borneo, presented by C. H. Sanctuary.

A one centesimo piece of Victor Emmanuel II., presented by C. H. Cayley.

Votes of thanks to the donors were proposed by the President.

Saturday, May 12th.

The Secretary, R. R. Ottley, gave a lecture on "Red Indians."

These he classified simply according to the tracts they occupied, and in some degree by their habits, and their mode of building their huts, or constructing their tents. He said something also of the shameful treatment which many of the finest tribes had experienced at the hands of the whites. Most of the principal tribes have peculiar ways and superstitions, though much is common to the whole race, and the people, as a whole, have long been an enigma to ethnologists, philologists and philanthropists.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne and carried unanimously.

Saturday, May 26th.

P. H. Carpenter, Esq. gave a lecture on "Greenland."

Greenland is a great wedge of land hanging down from the North Pole and usually described as a continent. Its area is about 800,000 square miles. Of the interior little is known and the East coast is only accessible with difficulty on account of its being washed by the ice stream from the Polar Sea. The West coast is more open and is fairly well known from Cape Farewell as far North as latitude 73½°. Until Sir George Nares' expedition Cape Sumner, in latitude 82°, was supposed to be the

most Northerly point, but Beaumont found that this was only the mouth of a deep bay and surveyed the coast, which runs in a North Easterly direction, up to latitude 82°.30′, seeing land still further in the same direction.

On travelling inwards from the coast a solid wall of ice varying in height from a few hundred up to three thousand feet is always encountered. When viewed from a mountain top the ice may be seen rising inwards with a gradual and regular ascent covering all but the highest mountains and presenting the appearance of a vast frozen ocean. Several attempts have during the last two centuries been made to cross this sea of ice but up to the present time without success.

Nordenskjöld for meteorological reasons believes that a continuous covering of ice over the whole interior is impossible, and that the ice wall, running parallel with the coast, may enclose an open country free from ice and perhaps even woody in the Southern parts. Sir Joseph Hooker, from a study of the coast flora, has arrived at the same conclusion. Brown and others believe that the ice stretches in one unbroken sheet over the whole interior, whilst Scoresby was of opinion that the so-called continent was a collection of islands covered up and bound together by a continuous ice sheet. In support of the last view are quoted many traditions held by the West coast Eskimos of whales, driftwood, &c., coming down the fjords from the East coast.

It was shewn by Sir George Nares that Greenland does not, as had been supposed, stretch across the Pole but that it probably ends in a series of islands forming a Polar Archipelago like those on the North coast of America.

The present condition of Greenland is interesting, as during the glacial period a very large part of the Northern Hemisphere, including Scotland and all but the Southern parts of England, must have been in the same condition. During several periods long anterior to this the climate of the whole Northern Hemisphere and especially of the Arctic Regions was far warmer than it is now. In Spitzbergen, in Greenland, and in various parts of the North American Archipelago plant remains occur of the same character as those which flourished in England at the time our coal was formed and which resemble plants now found in the tropics. Millions of years after this, when most of the South East corner of England formed the estuary of a large river flowing Eastwards along the line of the British Channel, Greenland was again above the sea and covered with plants, and once more during the period of the Upper Cretaceous or chalk formations, poplars, fig trees, and magnolias were abundant.

Long after the deposition of the chalk there seems to have been a very warm climate over the whole Northern Hemisphere. The average European climate at that time must have been at

least 16° and that of Greenland as much as 30° F. warmer than at present. The plants of this period are mostly evergreens, such as would have been destroyed by a single winter like those now experienced in Central Europe.

During the period when the hills of Disco were covered with forests the whole North part of Greenland was the scene of an immense outburst of volcanic activity which was felt in Iceland, the North part of Ireland, Scotland, and as far South as central France and Germany.

Until the close of the tenth century of our era Greenland was probably uninhabited save by bears and reindeer, but about this time an Icelander driven Westwards by a severe storm sighted land and in the year 986 Eric the Red, an outlaw, sailed in search of it. After spending two winters there he returned to Iceland with the account of a "green land, a fair country, greener than Iceland," saying "if the land have a good name it will cause many to come thither." Numerous colonies were established on the West coast between Disco and Cape Farewell which flourished for 350 years. In 1126 a Bishop was appointed with twelve subordinates and the people contributed funds in aid of the Crusades. The ruins of churches and villages of this period still remain.

Suddenly, about the year 1350, a horde of Skroellings, the ancestors of the Eskimos, appeared from the North and gradually exterminated the Norsemen. The Eskimo tradition is that they reached Greenland from the North journeying Southwards from the head of Baffin's Bay. They were probably the descendants of some of the tribes driven out from Siberia by the Tartars during the tenth and eleventh centuries. These people moved on and on, ever seeking better hunting and fishing grounds, until they arrived at Smith Sound, crossed it while frozen and descended into Greenland.

Nothing is known of Greenland between the years 1450 and 1585 when it was rediscovered by Davis in his attempts to find the North West passage. Thirty years later Baffin visited the country but nothing authentic is known about either Eskimos or Norsemen until 1721 when the present European stations were established in Greenland by Hans Egede, a Danish Missionary.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Matthews and carried unanimously.

[Since Mr. Carpenter's lecture Baron Nordenskjöld has succeeded in penetrating into the heart of Greenland, and has set at rest the vexed question of the state of the interior of the continent. Baron Nordenskjöld started from Auleitsivik fjord, a a little south of Disco Bay, on July 3rd, and by the 21st. had reached a point some 80 miles inland reckoned from the ice

border. Here he was obliged to stop it being impossible to drag the sledges any further through the wet snow. The next day he sent forward two Lapps on "skidors"—long strips of pine-wood attached to the foot by a strap at the centre. These Lapps went 130 miles further and were then forced to return through the want of drinking water and fuel, but although they had traversed more than half the breadth of the continent the ice sheet still stretched as far as the eye could reach. The ice rose gradually from the border and at the furthest spot reached attained an altitude of 7000 feet; it was still rising towards the east. Ed.]

Saturday, June 9th.

E. A. Mitchell-Innes gave a lecture on "Edinburgh and its history."

The lecturer first briefly mentioned the points worthy of notice in the "New Town" or more modern portion of Edinburgh. Then leaving these, he went on to follow some of the legends and historical memories that haunt the old town. He went through the Canongate touching on the names of Montrose, John Knox, Portens, and the Wizard of the Bon, with whom this street is so intimately connected. Then he discoursed shortly upon Holyrood and its history, ending the lecture with a narration of the legend of St. Anthony and a description of some of the scenes of historical fame which were enacted in the Cowgate and other great thoroughfares of the "Old Town."

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne and carried unanimously.

Saturday, June 30th.

W. N. Shaw, Esq. gave a lecture on "Tops."

After pointing out the distinction between motion in a straight line and motion in a circle, shewing that the latter could only be produced when a force was continually acting on the body in a direction at right angles to that in which it was moving, the lecturer passed on to consider the rotation of a body with one point fixed, a case which represents very nearly the motion of a top. By means of the gyroscope it was shewn that if the body is quite symmetrical about the axis of rotation and no external forces act upon it then it will continue to spin about an axis maintaining continually the same direction in space, but that if

the axis of rotation is not an axis of symmetry this need not be the case. When a top has nearly reached the end of its spin the axis may be seen to move very considerably; this is due to the fact that the fixed point is here considerably below the centre of gravity, and that the weight of the top tends to cause it to fall over, if the top were not spinning it must fall but when the top is rotating the effect is apparently quite different and the axis of rotation moves round in such a way as to describe a cone. This was illustrated in various ways with tops of different kinds, moreover the earth itself, rotating about its polar axis, is practically a top exhibiting similar peculiarities in its motion. The attractions of the sun and moon on the protubuant parts of the earth about the equator cause the axis of the earth to move very slowly in the same way as that of a falling top. In this case the cone is described in 25868 years and the change in position during a life time is therefore scarcely perceptible, but in 12934 years our pole star, which is now very nearly in a line with the earth's axis will be about 47° away from it.

When a top has been set spinning it is gradually reduced to rest by friction: by giving it a hard steel point and spinning it on an agate plate the friction at the point of support may be reduced to a very small amount, but it is still perceptibly retarded by the friction of the air. The existence of this friction is rendered evident in the humming top; the hum is produced by the air which blows across the hole being directed first towards and then away from the air confined in the interior, this confined air is thus set in vibration and the hum—which is due to a series of rapid vibrations of the air—is produced.

The lecturer then considered the direction of the currents of air round a top, these set towards the top at each end of the axis, then along the surface to the greatest diameter where the air is thrown off in the plane at right angles to the axis. This throwing off of particles was illustrated by blowing a little water on to a top while it was spinning, the water was at once thrown off in fine spray. A top was then shewn in which holes were made near the axis and others on the circumference at the widest part, so that the air instead of having to creep along the surface was drawn in at the former and thrown out at the latter set of holes, in its passage through the top it had to pass over a set of reeds which were made to vibrate and a musical chord produced. The fact that the currents of air really did set in this way was shewn by spinning the top in some artifically produced smoke, the small particles being carried along with the air shewed very clearly the direction in which it moved.

Finally some tops were shewn in which the effects produced depended on the persistence of vision and the composite nature of colours. When the eye has once seen an object it continues

to see it for a fraction of a second after it has been removed, and if it is again presented to the eye before this impression has faded it will be seen continuously. If two parts of a picture are painted on different sides of a card which is caused to rotate rapidly so as to present the two sides alternately, the eye will combine the two parts and see the picture as a whole. This is the effect produced in the ordinary thaumatrope. Other effects may be produced by placing differently coloured sectors on a rapidly rotating top when the eye will mix the colours and see that due to their combination. Several very fine effects were produced by rapidly changing the coloured sectors while the tops were in rotation.

At the conclusion Mr. Carr moved a vote of thanks to the lecturer in a humourous speech which was thoroughly appreciated by the audience.

Saturday, July 21st.

D. N. Pollock gave a lecture on "Some points of interest in Westminster Abbey."

The lecturer after giving a short account of the history of the Abbey from its foundation, and its vicissitudes in more modern times, when it fell with all other ecclesiastical buildings into the hands of the Puritans, and also into the hands of the French at an earlier period, proceeded to give some description of the interior. Taking the different quarters of the building, he tried to classify the tombs under the heads of different professions: the most conspicuous being the Poets' Corner and the Statesmen's Corner. He traced the lines of Royalty that had found a resting place within its walls, from the building of the shrine of Edward and his supposed burial there up to the latest times: and finally dwelt shortly on the enormous interest that the building had for all Englishmen: how it was bound up with their lives and homes, how it was the centre of English patriotism: where from the earliest times the remains of English Worthies had been laid and had accumulated so as to give a sense of venerableness and dignity to the building as none other possesed in England or even in Europe.

Unfortunately the slides which had been ordered for this lecture were not sent, and the lecturer was therefore obliged at the last moment to dispense with the illustrations on which he had depended. The able manner in which he overcame all difficulties and succeeded in interesting his audience left a feeling of regret only that he had not more frequently given us the opportunity of listening to him.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Davenport and carried unanimously.

Saturday, October 13th.

T. E. Crawhall read the successful Pender Prize Essay on "The Telephone and Microphone."

The Essay began with a short introduction on Sound. How we hear it and what it is. It was shewn to be due to vibrations which are conveyed to the ear by means of the atmosphere, whilst different pitches of sound were explained as being caused by the number of vibrations heard in a second.

The rudiments of the telephone proper were known in 1837, by Page. Reis, Varley and Gray experimented on it, but Bell was the real inventor of the telephone which bears his name.

Next induced currents were explained; it was shewn that if a magnet was inserted into a coil of wire, a galvanometer needle would be deflected if connected with that coil—thus proving the presence of a current; and again that on pulling it out, another current was induced. When the magnet was left in one position within the coil the needle remained stationary, thus proving the absence of a current, but when a plate of iron was caused to vibrate before the magnet, at rest in the coil, the needle was deflected—thus again proving the presence of a current. This is the principle of the telephone. When you speak before the plate, it vibrates, thus causing induced currents, which travel along the wire and alter the magnetic field in the neighbourhood of the second telephone in such a way as to cause its iron plate to vibrate in nearly the same way as that of the exciting telephone.

The different parts of the telephone were then shewn, these were

(1) Permanent Magnet.
(2) Bobbin and Coil.
(3) Case.
(4) Top of Case.
(5) Ferrotype Plate.

The greatest distance that the Telephone has been used for talking was in India, 500 miles overland. It has been used on the submarine line between Calais and Dover.

The Microphone was next referred to and several specimens were shown. By means of one of these the rubbing of a camel's hair brush on parchment was made audible to an audience of 40.

At the conclusion Mr. Carr said it was kind of the President to give him the opportunity of informally thanking the winner of the Pender Prize for his clear paper and successful experiments. He was also glad to be able to say a few words about Henry Pender himself. There were points in his character and career for which Wellington College and the Natural Science Society especially might well honour his name. It was this Society

which first gave the impetus to his scientific studies in which he was rising to eminence when his career was cut short by a fatal attack of fever. One or two instances would show his skill and thoughtfulness. Being in South America during the war between Chili and Peru he took photographs of the Huascar with the view of illustrating the effect of shot on iron plates. The information thus gained proved of value to the Admiralty and Pender's services were acknowledged in a flattering way. His practical skill was tested in a cruise in Mr. Seth Smith's Yacht which was manned by members of the Volunteer Naval Brigade to which he belonged. When the cruise was over the prize for excellence in all the departments of practical seamanship was awarded to Pender by the unanimous vote of his comrades. Few have endeared themselves more to a wide circle of friends. And few have met with more fitting memorials. One memorial was an Organ in Foot's Cray Church which would recall his love of that instrument and the skill with which he used it. Another memorial was this prize which he would have entirely appreciated both because it connected his name and memory with the College which he loved so dearly and because it might lead some in each successive generation into the same channel of earnest scientific research which gave him such great delight and which is certain if conscientiously followed to bring the same happy results to others.

The following donations were announced:

Some Geological Pamphlets by Professor Rupert Jones, F.R.S.

A collection of shells by R. T. R. Laurence, Esq., (O.W.)

Votes of thanks to the donors were proposed by the President.

Saturday, October 27th.

H. G. Lyons, Esq., F.G.S., gave a lecture on "Heavy guns and how they are made."

The lecturer commenced by a short sketch of the rise and growth of the manufacture of ordnance, briefly noticing the main stages of its development.

The invention and employment of artillery was of course subsequent to the discovery of gunpowder, which is usually attributed to Roger Bacon and Bartholdus Schiraz in the 13th century. Evidence is however forthcoming that the Chinese were acquainted with some explosive of a similar character very much earlier, as their "thunder of the earth" is spoken of as early as the 3rd or 4th centuries. They used stone shot and mortars till the 17th century, when they learned how to cast metal ordnance from the missionaries.

In England it is doubtful whether cannon were really used for the first time at the battle of Crecy, but Edward III certainly instituted artillery.

Progress was very slow, and indeed hardly any was made till the beginning of this century, when the manufacture of the cast iron smooth-bore guns was much improved, but the same old type of gun was used. It was not indeed till some 30 years ago that rifled ordnance began to replace the old smooth-bore pieces.

Before entering upon a description of guns and their manufacture the various metals employed were first mentioned and their advantages and disadvantages pointed out.

Bronze or gun-metal was shewn to be too soft for rifled ordnance, though it was used for smooth-bore field-guns.

Cast iron was used for all smooth-bore guns except the bronze field-guns. It is easily melted and cast, besides being economical, but when over-strained it gives way suddenly, and therefore it was unsuited to the heavy charges of modern guns.

Wrought iron differs but little from the preceding, in chemical composition containing from 1 to 3 per cent. instead of 2 to 5 per cent. of carbon: it possesses however several important properties, viz. that of welding when heated, and of being malleable, and ductile.

Steel is stronger and more elastic than iron and may be rendered harder and tougher by tempering.

The oldest guns still retained are smooth-bore cast iron guns, which have not yet been replaced by modern rifled ordnance. The manufacture of a cast iron smooth-bore gun was then described. The mould is made with the breech downwards, as it is desirable that that should be the strongest part, and the molten metal poured in and allowed to cool. As the casting cools, a crust is formed on the outside while the interior is still liquid, and when the latter in its turn cools and contracts it breaks away in places from the outer portion, forming rifts and cracks in the casting, at the same time straining the metal.

In 1855 the employment of rifled small-arms and armour for ships necessitated the adoption of rifled guns, and England has used wrought iron for hers until quite recently, though some countries, as Sweden, and America and others, have used cast iron strengthened with bands on account of its cheapness. As early as 1615 the advantage of rifled guns was appreciated, but the backward state of machinery was the chief barrier to its adoption. After the Crimea Napoleon III rifled his bronze field guns, which were used with effect at Magenta and Solferino in 1859.

In England Sir W. Armstrong made a wrought iron rifled breech-loading gun, and it was adopted. His principle of manufacture was to strengthen an inner tube by coils or cylinders

of wrought iron, the inner diameter of which was slightly less than the exterior diameter of the tube. The cylinder was expanded by heat and slipped over the tube which it gripped tightly on cooling.

This grip resists the circumferential tension or the tendency of the charge to split the gun open longitudinally.

There is also another strain, the longitudinal tension, or the tendency to blow out the breech, which is resisted by hooking the coils together.

The advantages and disadvantages of breech-loading and muzzle-loading guns were then pointed out and briefly discussed; and the different methods employed for rifling were mentioned.

The manufacture of a 9 inch rifled muzzle-loading gun of 12 tons was next described in detail.

The different rifled muzzle-loading guns in the service were next named, and any peculiarities in them pointed out. The new steel breech loading guns were then mentioned, and the differences in manufacture between them and the muzzle-loading guns explained, as was also the system adopted for closing the breech. The lectnrer went on to explain the different kinds of projectiles usually employed, viz. Common Shell, Shrapnel, Case Shot and Palliser shell, and their use, as also the fuzes used to explode them; the effect of heavy projectiles on armour was next briefly mentioned and the target recently erected at Shoeburyness was described, also the effect of four shots from the 80 ton gun upon it.

The lecture was illustrated by models and diagrams.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Davenport and carried unanimously.

Saturday, November 10th.

Major Cooper King, F.G.S. gave a lecture on "Local Gossip."

The lecturer commenced by stating that England at one period, how long ago he could not say, formed part of the high land of a large Northern Continent, and must have then experienced the extremes of a continental climate. During this period there were at least two distinct glacial epochs, when the land in the centre of the district was covered with ice, the marks of the glaciers then existing may still be seen on Snowdon.

The gravel beds deposited during this period by the Thames, which was then a tributary of the Rhine, contain a large number of bones of animals, such as elephants, horses and bulls, the teeth of which may be distinguished by their shape, those of the horse being almost cylindrical, whilst those of the bull have a broader

base and taper slightly towards the crown. With these are found the flint implements of the palœolithic man, stones rudely shaped by a few rough blows but still with an evident design. This palœolithic man was probably no more than a skin-clad savage, fearing his fellow man, and living in small isolated families, dwelling by river sides for the sake of the water and using his flint implements for the purpose of breaking the ice. It is remarkable that the places occupied then, as shewn by the existence of these implements in the gravel beds, were to a large extent the same as those on which stand the towns of the present day.

After several oscillations of level England became a peninsula, connected with the European continent by an isthmus across what are now the Straits of Dover, whilst Ireland was completely separated and became an island. Another race then entered the country, probably by this isthmus, from Gaul; these were the Celts or neolithic men, whose flint implements are far more elaborately worked and polished, and some could not be surpassed for workmanship even at the present day. The positions of the villages and head quarters of these tribes as identified by finds of flint flakes were pointed out on a map. In searching for these flakes the most likely places are those where we find dry, not marshy, land, near water with an ancient Celtic name and near an old track way; when all these conditions are fulfilled a search may be undertaken with a very fair chance though not a certainty of success.

The next step forward in civilisation is shewn by the introduction of bronze tools of simple form. These bring us down to the time of the Roman invasion under Cæsar. At this time a great part of the South of England was covered with large forests which rendered locomotion difficult, the trackways between these were probably few, but several have been well identified. The chief Roman towns were Pontes and Venta Belgarum on the sites of Staines and Winchester respectively, Calleva, which we now know as Silchester and Sorbiodunum, a few miles from where Salisbury now stands. Roman architecture may be frequently identified by what is known as the "herring bone pattern," the bricks being arranged so that those in one row formed an acute angle with those in the next, like the bones of a herring; their bricks were flatter and larger than those in use before their time, very much resembling ours. But the surest signs of their habitation are the oyster shells which are invariably found near their old towns; oysters appear to have been in great request at this time. The influence of Roman civilisation was confined almost entirely to their towns, and directly their power ceased to be, all traces of it passed away.

The next inhabitants of the land were the Saxons, who are noted chiefly for their cruelty. Whatever place they captured

they destroyed, killing the men and taking the women and children into captivity. There are a few traces of Saxon work to be found in churches and a few Saxon barrows, but their occupation of the country has left its record chiefly in traditions and in the names of their towns. The Danish occupation has left no traces at all, except in a very few place names.

An old Saxon barrow has recently been opened at Taplow. The first things found were some flint flakes, bone tools, and Roman pottery which must have been in the ground before it was disturbed by the makers of the barrow, but on reaching a depth of about eight feet below the level of the surrounding country the excavators came upon the remains of the old Saxon chief over whom the mound had been raised. Here they found the rich gold lace of his mantle, three massive gold buckles, a large vase, several bronze ornaments of various kinds, the iron bosses of two Saxon shields, three bronze drinking buckets, and several drinking vases and horns ornamented with silver. At the bottom of all were found a set of ivory draughtsmen and the fragments of a sword and spear.

After the Saxons came the Normans, occupying the same lines of country as the preceding races. One of the most interesting remains of their times is Wanboro' Castle, where, in the time of King John a party of two officers and ten men stopped the advance of the whole army of France under King Louis; here also Robert Bruce was confined, and here King John slept the night before he signed Magna Charta. The Normans also built Basing-house which during the civil war was taken and destroyed by Cromwell, but not until the Royalists who held it had inflicted such losses upon the Parliamentarians as to earn for their stronghold the name of Basting-house.

The lecturer concluded with an earnest appeal to his hearers to observe and make notes of any relics of old times that might come in their way; these were day by day passing away from us, several in this neighbourhood had been destroyed within his own recollection, and unless accounts of them were written down their memory would soon cease to exist. Old furniture might often be found in cottages and old arms in blacksmith's shops, a sword was shewn which the lecturer had discovered in a blacksmith's shop at Blackwater, it bore the motto "In Te Domine," and had doubtless been used by either a Royalist or a Parliamentarian in the time of Cromwell.

The lecture was illustrated by a large map of the district, shewing the sites of the towns and villages occupied by the different races, and the trackways by which the principal towns were connected, as well as by numerous specimens of flint and bronze implements from Major Cooper King's own collection.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne and carried unanimously.

Saturday, December 8th.

Professor Carlton Lambert gave a lecture on "Artificial Illumination."

The lecturer commenced by pointing out that combustion is not, as is frequently supposed, a destruction of the thing burnt inasmuch as for every ton of coal put on a fire more than three tons of something goes up the chimney; it is in reality a union of the substance burnt with the oxygen of the atmosphere. When combustion takes place in pure oxygen it is more violent than when in the air since in the latter case the flame is cooled by the introduction of the other constituents of the atmosphere.

The substances employed for illumination are almost entirely Hydrocarbons or compounds of carbon and hydrogen. When these are burnt carbonic acid gas and water are formed. The former of these is injurious, and a very slight increase in the amount present in the atmosphere will produce a decided effect upon those who breathe it.

An ordinary flame consists of three parts; in the interior is cool unburnt gas, outside this where the gas first meets the oxygen of the atmosphere the hydrogen is burnt, the supply of oxygen in this part of the flame is not sufficient to burn the carbon which is therefore separated in a solid form and is raised to incandescence by the heat generated in the combustion of the hydrogen; in the outer part of the flame which, though not luminous, is intensely hot the carbon is completely burnt. The luminosity of the flame is thus due to the incandescence of the solid carbon particles. In the Bunsen or atmospheric burner air is mixed with the gas before it enters the flame and there is therefore no separation of solid carbon.

In order to produce a brilliant incandescence a high temperature is necessary and hence the use of the hydrogen of which coal gas contains a large percentage. When this is burnt it gives out scarcely any light but the flame is rendered very hot and the higher the temperature produced the more brilliant does the incandescence of the solid carbon become.

When the quantity of carbon is insufficient the illuminating power of a gas may be increased by mixing with it the vapour of a hydrocarbon, such as benzoline or napthaline, each of which is rich in carbon. This is the principle of the Albo-carbon burner the essential part of which is a vessel containing a solid substance called naphthaline or, by the makers, Albo-carbon. This when heated by the gas flame is slowly volatilised and the vapours mixing with the coal gas supply the necessary carbon.

In order to obtain the maximum of light from a poor gas a large burner should be employed, more gas is consumed by the

larger burner but one burning 6 cubic feet an hour will give far more light than two burners each consuming 3 feet. This affords a very simple explanation of the action of the "duplex" in which the flames from two small burners are allowed to unite and are found to give more light than two similar burners a short distance apart, but just as good an effect may be obtained by consuming the same quantity of gas in a single burner. With richer gas such as is obtained in the north of England a smaller burner may be employed with advantage.

The part of the burner in contact with the flame should be made of steatite or some other bad conductor of heat. If made of metal, which is a good conductor, heat is carried away from the flame, the temperature is lowered and light is lost. In order to ensure a sufficient and steady supply of air to the flame the globe, where one is used, should always have a wide opening at the bottom; a small opening causes a draught.

From the following table, based on Professor Lambert's own experiments it will be seen that the most efficient of the simple gas burners is Suggs' London Argand.

EFFICIENCY OF VARIOUS GAS BURNERS.

		Candle power	Consum. feet per hour.	Efficiency.
Bray's common "Fish-tail"	No. 1	2	4	·5
" " "	No. 2	3	4½	·66
" " "	No. 5	9	6	1·5
" " "	No. 7	14	7½	1·9
Duplex "Bat's-wing" (Heron's)		8	4½	1·8
Sugg's "Table Top"	No. 5	11	6	1·8
" with regulator	"	11	5	2·2
Large Fish-tail, Silber's, Brönner's and Comet		17	7½	2·3
Bray's "Special"	No. 9	20	8	2·5
Sugg's "London Argand"		15	5	3
"Bower" Regenerating Light		50	10	5
"Lewis" Incandescent "		50	10	5
Albo-Carbon "		24	4	6

The Lewis "Incandescent" light is obtained by forcing the gas mixed with a strong current of air through a piece of fine platinum gauze, no luminous flame is produced but the platinum is raised to a white heat and if the current of air is properly regulated a very powerful light is obtained. At present the air has to be stored under pressure and so forced into the burner but

Mr. Lewis believes that he will shortly be able to exhibit a burner inducing its own air supply.

The regenerating principle, well known in connection with the late Sir William Siemens' furnaces, has also been applied to gas burners, the latest development of the principle being the "Bower" regenerating light. Over the burner is a large mass of iron, covered with the magnetic oxide to prevent chemical action, and perforated with passages leading to the centre. When the burner is lighted this mass of iron soon becomes very hot and matters are so arranged that air before it can reach the flame has to pass through the passages in the iron where it is heated, the temperature of the flame is thus a good deal higher than when it is supplied with cold air and consequently the incandescence of the carbon particles more brilliant.

In order to obtain the best light without waste of gas a Gas Governor is necessary in all places where there is any danger of sudden alterations in the pressure. With an ungoverned burner an increase in the pressure causes the flame to roar, to burn more gas and to give less light than when the supply is properly arranged. Gas governors are of two kinds, there are those like Stott's which are applied at the meter and control the supply in all pipes fed from it, or those like Parkinson's which are attached to each burner separately. In the latter, which is extremely simple, an increased pressure forces a conical plug to a varying distance into a hole through which the gas passes and the supply is thus very effectively regulated.

In the electric arc the light is due chiefly to the incandescence of the carbon terminals which slowly burn away, the one connected with the positive pole about twice as rapidly as that connected with the negative. An image of the carbon points was thrown on the screen and the arc was also obtained under water. In the incandescent electric light, of which several specimens were exhibited, the light is due to the incandescence of a very thin carbon filament whih is intensely heated by the passage of the current.

The lecturer in conclusion referred to the views of Sir William Siemens, a very high authority on these matters, with regard to the best and most effective way of using our coal. When this is burnt in an open grate nine tenths of the heat and a large quantity of unconsumed fuel are carried up the chimney. It would be far more economical to first distil the coal as is done in the gas works and then burn the coke and gas separately. All the nuisance and dirt of smoke would thus be avoided and a far greater percentage of the heat could be utilised.

In the future we may look to electricity for our light, but the currents will in many instances be generated by gas engines, and it is to gas that we must look for heat whether it is to be used for cooking, for warming or for driving machinery.

The lecture was illustrated by a brilliant and successful series of experiments conducted by Mr. Haddon, Demonstrator of Physics at the Royal Naval College, Greenwich. These included the exhibition of the different gas burners and governors referred to as well as the demonstration of the properties of various gases.

At the conclusion votes of thanks to Professor Lambert and Mr. Haddon were proposed by Mr. Carr and carried unanimously.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Tuesday, January 30th.

At a P.B.M. the following were elected Associates: R. Munro-Ferguson, P. G. Henriques, A. Wilkinson, P. G. Godfrey-Faussett, O. G. Godfrey-Faussett, W. H. Wilson, C. H. G. Wood, G. B. Milne, S. E. Beevor, A. Parker, F. W. Parker.

A. D. W. Pollock was elected Meteorological Album Keeper.

A vote of thanks was passed to J. M. Coode the retiring Album Keeper.

E. A. Mitchell-Innes and J. A. C. Skinner were elected Members to serve on the Committee for the term.

The President announced that Mr. Rogers had offered to pay half the price of a Lantern Polariscope for the Society, if the Society would pay the other half.

A vote of thanks was passed to Mr. Rogers.

At a Committee meeting Hon. W. D. Cairns was elected Member, also B. T. Pell and A. D. W. Pollock under rule 31.

Monday, February 12th.

At a P.B.M., A. A. Longsdon, W. B. Longsdon, were elected Associates.

C. Lowry, Esq., and W. S. Robinson, Esq., were elected Honorary Members.

Monday, April 16th.

At a P.B.M. the following were elected Associates: R. S. Heywood, E. G. Verschoyle, M. P. R. Woodhouse, M. F. Halford.

M. Calais was elected an Honorary Member.

E. A. Mitchell-Innes and J. A. C. Skinner were elected to serve on the Committee for the term.

At a Committee meeting R. R. Ottley (Secretary) and E. A. Mitchell-Innes were elected as judges for the Pender Prize.

Monday, May 7th.

At a P.B.M., S. L. Barrett, F. G. Mackenzie, were elected Associates.

C. H. Sanctuary was elected Botanical Album Keeper.

Thursday, July 26th.

At a P.B.M., R. R. Ottley resigned the office of Secretary.

A vote of thanks was proposed for him by the President and passed.

H. B. Hopgood was elected his successor.

T. C. Pakenham resigned his post as Ethnological Keeper.

A vote of thanks was passed to him.

Saturday, October 6th.

At a P.B.M., C. T. Lavie resigned his post as Treasurer.

A vote of thanks was passed to him.

N. C. Macleod was appointed his successor.

The following were elected Assooiates: G. N. Colvile, W. J, Langton, R. G. Behrens, W. A. Barnett, J. W. S. Neill, F. Carver, R. E. B. Roe, E. P. Mark, W. E. Tomkins, A. H. Packe. B. W. L. McMahon, L. W. McMahon, R. B. M. Blois, G. P. T. Feilding, J. C. Kirk, W. F. Acland-Hood, V. L. Johnstone, H. L. D. Fordyce, H. T. Chilcott, A. Stanley, F. Lyon, G. F. Gorringe.

T. E. Crawhall and D. H. Barker were elected to serve on the Committee for the term.

F. G. Mackenzie was elected Ethnological Album Keeper.

G. Walter was elected Geological Album Keeper.

A. S. Wells was elected Botanical Album Keeper.

At a Committee meeting, N. C. Macleod, F. G. Mackenzie, G. Walter, A. Spencer-Wells, G. D. White, H. E. Stockdale, C. D. M. Blunt, were elected Members.

Wednesday, Nov. 14th.

H. G. Lyons, Esq., F.G.S., was elected a Corresponding Member.

A. Gray, Esq., was elected an Honorary Member.

Several candidates were proposed for election as Associates but the Society's numbers being complete the election had to stand over.

EXCURSIONS.

Expedition to Winchester, Thursday, July 12th.

It had long been proposed that a joint expedition of the Botanical and Entomological sections should be made to the Guildford Downs, and on one of the last half-holidays of the summer term the Master kindly granted permission for an early start to be made by the members of the Society. The weather however was exceedingly unpropitious; and, as the rain was still falling heavily when our party reached the station, it was determined to visit Winchester instead of the chalk hills. We travelled by Guildford and Alton through a country made very pretty by the hop-gardens; and, on arriving at Winchester, drove at once to the Cathedral. We inspected the noble nave and examined with interest the tombs of William of Wykeham and other early bishops, as well as the very curious font. Then we moved forward to the College, and visited the dormitories, hall, and chapel, all five hundred years old, and it did not lessen our appreciation of our own holiday to find some Winchester fellows hard at work with grammar and dictionary in their dormitory. Our time was unfortunately very short and the weather continued bad: so we were unable to visit St. Cross with its ancient abbey and hospital or even to get more than a cursory glance at Wolvesey. We returned, as we had come, by Guildford where we had tea, and reached the College shortly after seven, having had a very enjoyable day but not having been able to collect either specimens or observations for the benefit of the Society.

Expedition to Taplow, Saturday, November 17th.

An expedition to Taplow had been hastily organised on Friday, November 16th, for the following day, to see the Saxons remains which had been found there and about which Major Cooper King had told us in his lecture on the preceding Saturday. It had been arranged to start immediately on coming out of School at halfpast twelve, but the rain was descending in such torrents that it was decided to abandon the attempt. By two o'clock however the rain had stopped, and as this was the last day on

which the objects could be seen before their removal to the British Museum, the drag was re-ordered, and at about a quarter before three a party consisting of the President and nearly all the Officers of the Society started from the Great Gate.

It was nearly dark by the time Taplow was reached and having found an Inn where we could leave our horses we ordered tea and made our way to "The Gables," where Mr. Rutland was busily engaged shewing and explaining the relics to all comers.

These had all been found in an old barrow standing in the grounds of Taplow Court and the following account of the excavations which is extracted from the *Times* will give some idea of the immense archælogical value of the treasure.

"The old Norse Viking who, using the silent highway of the Thames in search of plunder, must have died down by Maidenhead, hence found his resting-place here. On the commanding height overlooking the shallows where his ship was beached, his men found a place lofty enough for their leader and rich even then in memories; and so, with many a wild chant, he and his treasures were placed beneath the 'hlœwe' of Taplow to remain even until now. They raised a tomb worthy of their leader and his wealth. The mound is 240ft. in circumference and about 15ft. high, and on its summit are the dead remains of an ancient yew-tree, whose knotted trunk is nearly 6ft. thick and whose age may certainly be estimated at possibly 600 years.

All archæologists must feel that they owe a debt of gratitude to Mr. Grenfell, lord of the manor of Taplow, and to the Rev. Mr. Whateley, vicar of the parish, for their freely-accorded permission to ascertain the real meaning of the ancient mound; and still more to Mr. J. Rutland, secretary of the Berks Archæological Society, for personally undertaking the laborious task of superintending and carrying out the excavation. It was felt very desirable to disturb the form and character of the tumulus as little as possible, so that it might be eventually restored to its former external condition; and, irrespective of the enormous weight of the old yew-tree which rendered its removal extremly difficult, it was decided that if possible it should remain undisturbed. But the results have very fully repaid the care taken and probably no richer or more instructive discovery has been made in the south of England than that which is now in progress. A line having been traced due north and south on the surface, a cutting 6ft. wide was made about 4ft. above the ground level on the south side of the mound until it reached the foot of the tree, and thence a shaft was sunk downward and underneath the root and united with a second vertical shaft sunk on its north side. The earth material throughout the whole of the excavation was very loose and friable, and showed traces of

the way in which it had been piled up. It was composed of the natural red sandy gravel of the surface, mixed and intercalated with black earthy matter; and throughout it contained fragments of bones and teeth of horse, pig, and ox, and broken pieces of British and Romano-British pottery. One fragment of Samian ware, at a depth of 16ft., showed that Roman vessels had been brought there, and some pieces of coarse brown ware had their surface pinched up into rough knobs similar to those designated 'grape cups' by Sir Richard Colt Hoare in his 'History of Wiltshire.' Flakes of flint and used 'scrapers' were also numerous, but there were no decidedly human bones. All this pointed but to one conclusion—that, whatever the tumulus was erected for, it was *post*-Roman.

At about 20ft. from the top of the barrow its sepulchral character became at last clear. In the dark brown earth were uncovered lines of gold, and these, on being carefully removed, proved to be the remains of gold fringe, about an inch wide. They lay as if forming the edge of a garment extending diagonally downward from the shoulder across the body. But all doubt as to the nature of the interment was set at rest by finding close to this a magnificent gold fibula, weighing about four ouces. In length about four inches, as rich in colour as if just manufactured, enamelled and most richly chased with Scandinavian ornamentation, it seemed to have suffered little by its long entombment. Just below it was the owner's iron sword, heavily rusted in the sheath, and so friable as to break into fragments when it was removed; and near to this latter were two other gold fibulæ, smaller in size than the shoulder brooch, but equally beautiful, in one of which was a fragment of stamped leather. From the impression in a fragment of decayed wood which enclosed this, it seemed as if the upper garment had been composed of woven woollen fibre, gathered round the waist by a leather belt fastened by two buckles, and over all an upper gold-fringed cloak or tunicle, fastened on the shoulder by the heavy brooch of gold. On the right of the sword were the remains of an iron knife, probably the 'sceax.' There were scarcely any traces of bone. The scarce fragments were very friable and broken; but from the presence of numerous decayed fragments it seemed as if the entire body, clad in its Royal robes, had been covered over by broad planks of wood. Over the middle of the interment was a large pile of archæological treasure. Underneath was the heavy wood-lined and bronze-plated circular shield, resting on which were two drinking-horns, the small ends of which were encased in gilded bronze, and the mouths encircled by embossed mugs of silver. Remains of armillæ, or bracelets, silver-rimmed and of bronze, with deeply serrated edges, lay near; and on the north-west side of the shield were the relics of a wooden bucket,

encased with richly-stamped bronze. Mingled with these were the fragments of at least two vessels of thin, greenish glass, ornamented with parallel horizontal lines, similar to modern 'Venetian' glass, and decorated with broad, projecting spikes of glass. Such vessels are known to be of Saxon times. Mr. Llewellin Jewett pictures them, and their forms are well known; but the fragments of these at Taplow certainly show a larger and richer variety than those which have been hitherto found. The largest was certainly four inches wide at the mouth and 11 inches high. There was yet another vase of a similar character close to the large gold fibula; but all these were in fragments, and so friable were the remains that it was impossible, even with the utmost care, to remove them other than piecemeal. It is probable, too, that, judging from the number of the bronze and iron fragments, some of them may be found to form portions of a helmet or of body armour; but this is at present merely conjecture. Over the wooden plank that undoubtedly protected these relics—for it was found completely enclosing and covering them—was placed the spear, which in this case had the point towards the west, and, moreover, had a barbed point, with a very long iron socket. As at present so few fragments of bone have been found, it is almost impossible to define accurately the race to whom the 'mighty dead' belonged, or the date of the interment. Apparently the body lay a little south of east and north of west, with the head towards the east; and that the decorations are Scandinavian admits of little doubt. From the presence of so much treasure, under so great a mound of earth, its owner must have been a man of note. From the bronze bucket, which was used in Saxon ships of war, he probably was one of those hardy pirates who ravaged the coasts and rivers of Britain, when the Romans had deserted them. And, lastly, he was a Pagan—a Viking of the Northern seas, possibly, who left his Scandinavian home some thirteen hundred years ago. He was brought up from the pleasant river valley on the shoulders of his men, and buried on the site of the old Celtic village, amid the wild chants of his brave sea-dogs, and, as became him, after *wæs-hæl* to his memory. There is much to be learnt from the discovery, as well as interesting relics to be treasured. Gold ornaments of exquisite workmanship are placed with bronze armour and with iron arms. The underside of the shield was strengthened with a ring of iron, as was also the bottom of the bucket. With gold for decoration, bronze for defence, and iron for offence, the discovery affords another and most satisfactory proof of how difficult it is to distinguish between, or argue dogmatically about, definite 'ages of bronze and iron.' Whoever the chieftain was, he lived on the borderland between the two."

By the time that we had finished our examination of the relics and had inspected a few of the other treasures and curiosities with which "The Gables" is stored it was quite dark, and so, having expressed our thanks to Mr. Rutland for the trouble he had taken in shewing them to us, we made our way back to the Inn, where we had tea, and having eaten nearly everything that the landlord could provide we started for the College which was not reached until halfpast nine o'clock.

PRIZES.

A prize of the value of £5 is given annually by Mrs. Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition.

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two ordinary Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term, with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That peference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but

should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1883 was awarded to T. E. Crawhall for an essay on "The Telephone and Microphone."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The winner of the first prize for 1883 was C. H. Meares; the second prize was not awarded.

Mr. Lane offered a prize, value £1, for the largest number of first finds of the flowers of plants in the Meteorological Society's list for Phenological observations.

The prize which was open to the whole School was awarded to P. N. Jones.

PHENOLOGICAL REPORT.

During the year a second attempt was made to obtain observations of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list.

Prizes were offered for the largest number of first finds of Plants in flower, the first of which was gained by P. N. Jones.

We print the complete list with the dates of the observations that were made. These were more numerous than those for 1882 but there is still room for much improvement.

The observers whose initials are given in a separate column were as follows:

H. A. Bull, Esq.	C. H. Lane, Esq.
A. C. Campbell	A. M. Lonsdale
L. Campbell	W. M. Madden, Esq.
Rev. E. Davenport	C. H. Meares
G. F. Gorringe	H. F. Newall, Esq.
F. H. Green-Wilkinson	C. H. Sanctuary
P. N. Jones	B. L. Sclater

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &c.)

1	**Anemone nemorosa** (Wood Anemone)	Mar. 3..B.L.S.
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)	Feb. 3..C.H.L.
3	*Ranunculis acris* (Upright Crowfoot)	Ap. 29..C.H.L.
4	**Caltha palustris** (Marsh Marigold)	Mar. 4..C.H.L.
5	*Papaver Rhœas* (Red Poppy)	
6	*Nasturtium officinale* (Water Cress)	May 21..C.H.L.
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)	Ap. 16..C.H.L.
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)	Ap. 21..C.H.L.
9	*Draba Verna* (Whitlow Grass)	Feb. 26..C.H.L.
10	*Viola odorata* (Sweet Violet)	Feb. 19..H.F.N.
11	*Polygala vulgaris* (Milkwort)	May 13..C.H.L.
12	*Lychnis Flos-cuculi* (Ragged Robin)	May 31..P.N.J.
13	*Stellaria Holostea* (Greater Stitchwort)	Ap. 3..C.H.L.
14	**Malva sylvestris** (Common Mallow)	
15	*Hypericum tetrapterum* (Square St. John's Wort)	
16	,, *pulchrum* (Upright St. John's Wort)	
17	**Geranium Robertianum** (Herb Robert)	May 21..C.H.L.
18	*Euonymus europœus* (Spindle-tree)	
19	*Acer Pseudo-platanus* (Sycamore)	
20	*Æsculus Hippocastanum* (Horse Chesnut)	
21	*Cytisus Laburnum* (Laburnum)	
22	**Trifolium repens** (Dutch Clover)	May 25..L.C.

23	*Lotus corniculatus* (Bird's Foot Trefoil)	May 24..P.N.J.
24	*Vicia Cracca* (Tufted Vetch)	
25	,, *sepium* (Bush Vetch)	
26	*Lathyrus pratensis* (Meadow Vetchling)	
27	**Prunus spinosa** (Sloe, or Black-thorn)	Ap. 15..C.H.L.
28	*Spiræa Ulmaria* (Meadow-sweet)	
29	*Potentilla anserina* (Silver-weed)	May 15..C.H.L.
30	*Rosa canina* (Dog Rose)	
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)	
32	*Cratægus Oxyacantha* (Hawthorn)	May 20..L.C.
33	*Epilobium hirsutum* (Great Hairy Willow-herb)	
34	,, *montanum* (Broad Willow-herb)	
35	*Angelica sylvestris* (Wild Angelica)	
36	*Daucus Carota* (Wild Carrot)	
37	**Hedera Helix** (Ivy)	
38	*Cornus sanguinea* (Dog-wood)	
39	*Syringa vulgaris* (Lilac)	
40	*Galium Aparine* (Cleavers)	May 21..C.H.L.
41	,, *verum* (Yellow Bedstraw)	
42	*Dipsacus sylvestris* (Wild Teasel)	
43	*Scabiosa succisa* (Devil's-bit)	
44	*Petasites vulgaris* (Butter-bur)	
45	**Tussilago Farfara** (Coltsfoot)	Feb. 8..C.H.L.
46	**Achillea Millefolium** (Milfoil, or Yarrow)	
47	*Chrysanthemum Leucanthemum* (Ox-eye)	May 19..C.H.L.
48	*Artemisia vulgaris* (Mugwort)	
49	*Senecio Jacobæa* (Ragwort)	
50	**Centaurea nigra** (Black Knap-weed)	
51	*Carduus lanceolatus* (Spear Thistle)	
52	,, *arvensis* (Field Thistle)	
53	*Sonchus arvensis* (Corn Sow Thistle)	
54	*Hieracium Pilosella* (Mouse-ear Hawk-weed)	
55	**Campanula rotundifolia** (Hair-bell)	
56	*Ligustrum vulgare* (Privet)	
57	**Convolvulus sepium** (Greater Bind-weed)	
58	*Symphytum officinale* (Comfrey)	
59	*Pedicularis sylvatica* (Red Rattle)	Ap. 25..C.H.S.
60	*Veronica Chamædrys* (Germander Speedwell)	Ap. 4..C.H.L.
61	*Mentha aquatica* (Water Mint)	
62	*Thymus Serpyllum* (Wild Thyme)	
63	*Prunella vulgaris* (Self-heal)	
64	*Nepeta Glechoma* (Ground Ivy)	Mar. 30..C.H.L.
65	*Galeopsis Tetrahit* (Hemp-nettle)	
66	*Stachys sylvatica* (Hedge Woundwort)	
67	*Ajuga reptans* (Bugle)	Ap. 21..C.H.L.
68	**Primula veris** (Cowslip)	
69	*Plantago lanceolata* (Ribwort Plantain)	Ap. 25..C.H.L.
70	*Mercurialis perennis* (Dog's Mercury)	Jan. 24..C.H.L.
71	*Ulmus montana* (Wych Elm)	
72	*Salix Caprea* (Great Sallow)	Feb. 19..H.F.N.
73	*Fagus sylvatica* (Beech)	
74	*Corylus Avellana* (Hazel)	Feb. 11..B.L.S.
75	*Orchis maculata* (Spotted Orchis)	
76	*Iris Pseud-acorus* (Yellow Iris)	
77	*Narcissus Pseudo-narcissus* (Daffodil)	Feb. 19..H.F.N.
78	*Galanthus nivalis* (Snowdrop)	
79	**Scilla nutans** (Blue-bell)	Ap. 21..C.H.L.

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY.)

80	*Melolontha vulgaris* (Cock Chafer, or May Bug)	May 28..C.H.M.
81	*Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)	
82	*Timarcha lævigata* (Bloody-nose Beetle)	
83	*Lampyris noctiluca* (Glow-worm)	June 22..W.M.M.
84	*Apis mellifica* (Honey Bee, or Common Hive Bee)	Mar. 5..H.A.B.
85	*Vespa vulgaris* (Wasp)	Ap. 29..C.H.M.
86	*Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)	May 13..A.M.L.
87	,, *Rapæ* (Small Garden White or Cabbage Butterfly	Ap. 5..C.H.L.
88	*Anthocharis Cardamines* (Orange-tip Butterfly)	May 1..A.M.L.
89	*Epinephile Janira* (Meadow-brown Butterfly)	
90	*Bibio Marci* (St. Mark's Fly)	

BIRDS.

(ARRIVAL; SONG; NESTING; FIRST EGG.)

91	*Strix aluco* (Brown Owl)	
92	*Muscicapa grisola* (Flycatcher)	seen..May 25..E.D.
93	*Turdus musicus* (Song Thrush)	sg. ..Feb. 1..E.D.
94	,, *pilaris* (Fieldfare)	sg. ..Feb. 7..G.F.G.
95	*Daulias luscinia* (Nightingale)	sg. ..Ap. 29..E.D.
96	*Saxicola œnanthe* (Wheatear)	
97	*Phylloscopus trochilus* (Willow Wren)	sg. ..Ap. 22..C.H.M.
98	,, *collybita* (Chiff chaff)	seen..Ap. 28..C.H.M.
99	*Alauda arvensis* (Sky-lark)	sg. ..Feb. 3..E.D.
100	*Fringilla cœlebs* (Chaffinch)	sg. ..Feb. 5..E.D.
101	*Corvus frugilegus* (Rook)	
102	*Cuculus canorus* (Cuckoo)	sg. ..Ap. 19..E.D. &c.
103	*Hirundo rustica* (Swallow, or Chimney Swallow)	seen..Ap. 13..E.D.
104	,, *urbica* (House-Martin)	seen..Ap. 29..F.H.G.W. & C.H.M.
105	,, *riparia* (Sand-Martin)	seen..May 3..G.F.G.
106	*Cypselus apus* (Swift)	
107	*Caprimulgus europæus* (Goatsucker, or Fern-owl)	egg..June 3..A.C.C.
108	*Columba turtur* (Turtle Dove)	
109	*Perdix cinerea* (Partridge)	
110	*Scolopax rusticola* (Woodcock)	
111	*Crex pratensis* (Corncrake, or Land Rail)	

MISCELLANEOUS.

(FIRST APPEARANCE.)

112	Frog Spawn	Mar. 20..C.H.L.

METEOROLOGICAL REPORT.

No new instruments have been purchased during the year, but those in the Society's possession have been read daily at 9 A.M.

During the holidays the observations have been made by Sergeant Perkins.

In May Mr. Langercke, who was engaged in surveying the Estate for Mr. Baldwin Latham was kind enough to determine accurately the height of the rain gauge; the top of the funnel is 282·87 feet above Sea Level. The thermometers are—to the nearest foot—286 feet, and the barometer cistern 290 feet above Sea Level. As the observations for 1882 and previous years were reduced on the supposition that the height was 280 feet, ·01 inch should be added to all previously published barometer readings: those for 1883 have been reduced in accordance with Mr. Langercke's determination.

As some controversy has been raised with regard to the direction in which the wind blows another column has been added to the Report containing the direction for nearly every day in the year. We would warn anyone interested in the matter not to place too much reliance on the weather-cock over the Great Gate. The vane works very stiffly, probably in consequence of rust, and the North point is fixed considerably to the West of true North.

The observations have been sent every month to the Royal Meteorological Society, and those of the rainfall have been sent also to Mr. Symons, F.R.S., for insertion in his Annual table of British Rainfall.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/ₒ	0—10	In.	
1	29·84	53·5	48·9	85·1	52·9	52·0	51·1	94	10	·09	
2	29·72	49·1	44·5	83·8	45·9	43·9	41·6	86	7	·03	
3	30·00	48·6	42·2	52·0	43·1	40·4	37·2	80	9		
4	·13	44.5	40·2	49·0	42·1	39·3	35·8	78	10	·01	
5	·19	47·6	37·7	60·3	43·0	42·9	42·8	99	10	·11	
6	·38	42·5	33·3	72·6	36·2	36·2	36·2	100	8		
7	·34	41	33·3	58	37·9	37·4	36·7	96	10		
8	30·2	41	27	64	29	28			5		N.W.
9	29·7	40·0	33	68	34	31			5	·09	
10	·57	41·0		49·2	39·9	39·9	39·9	100	10	·01	
11	·55	40·1	37·6	43·3	39·9	39·9	39·9	100	10	trace	N.W.
12	·56	42·2	36·3	43·8	37·8	37·6	37·3	98	10	·04	N.W.
13	·23	43·7	37·2	51·0	40·9	40·7	40·4	98	10	·01	N.W.
14	·53	45·3	33·3	75·1	33·9	33·8	33·6	99	2	·19	E.
15	·35	51·2	33·4	80·9	40·0	39·9	39·8	99	9	·38	S.E.
16	29·70	45·7	34·2	76·9	35·9	35·4	34·7	96	7	·01	N.
17	30·06	49·5	33·4	52·0	43·1	42·9	42·7	98	10	·09	S.W.
18	·14	50·1	42·8	56·5	49·5	48·9	48·2	96	10	·03	S. W.
19	·29	48·7	35·3	50·2	38·1	38·1	38·1	100	10	·05	S.W.
20	·22	47·6	37·6	55·3	47·5	47·0	46·4	97	10	·05	S.W.
21	·36	47·8	44·6	53·2	45·6	45·4	45·2	99	9	·01	S.W.
22	·48	44·5	38·8	48·4	39·7	38·8	37·6	93	10		S.W.
23	·58	40·0	30·3	80·3	31·7	30·9	29·0	89	3		S.E.
24	30·24	40·7	28·2	47·1	34·1	33·6	32·7	95	9	·20	S.E.
25	29·64	46·3	33·5	46·0	36·4	34·1	30·8	80	0	·13	N.W.
26	·23	42·3	36·0	83·2	37·9	33·2	26·8	64	0	·05	N.W.
27	29·68	48·9	32·4	72·2	37·2	36·6	35·7	95	10	·21	S.
28	30·08	50·6	34·5	85·1	37·0	34·6	31·2	79	1	·18	W.
29	29·67	51·0	37·0	55·8	50·2	49·5	48·7	95	10	·44	S.W.
30	·70	44·0	33·7	89·1	35·9	33·9	30·9	82	3	·01	S.W.
31	29·48	39·0	27·2	53·0	32·6	31·8	30·1	90	8	trace	S.E.
Mean	29·90	45·4	35·9	62·6	39·6	38·6	38·0	92	7·6	Total 2·42	

FEBRUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	29·51	45·9	31·1	45·9	31·8	31·7	31·5	98	10	·36	E.
2	28·94	50·2	30·7	57·0	45·1	44·9	44·7	99	10	·44	S.
3	29·68	45·8	36·1	86·8	39·7	37·4	34·4	81	2	·03	S.W.
4	30·02	51·0	36·3		39·2	38·2	36·9	92	4	trace	S.W.
5	·20	49·4	37·4	87·2	39·2	38·9	38·5	97	7	trace	S.
6	30·04	44·6	32·5	82·9	35·1	34·9	34·6	98	0	·18	S.E.
7	29·80	48·2	35·1	82 6	39·8	39·4	38·9	97	10	·14	S.
8	·54	51·6	37·2	63·0	44·9	44·8	44·7	99	10	·50	S.
9	·77	49·5	37·4	90·3	38·9	38·6	38·2	97	9	·37	N.W.
10	·53	49·2	38·4	51·4	46·9	46·1	45·2	94	10	·68	S.W.
11	·55	48·0	38·4	86·8	38·9	37·7	36·1	89	6	·03	W.
12	·53	45·5	38·8	48·3	44·6	42·1	39·2	82	10	·39	S.E.
13	·79	47·4	37·3	92·1	40·7	38·3	35·3	81	2	·02	S.
14	·90	49·4	38·2	54·7	44·9	44·0	42·9	93	10	·39	S.
15	29·93	53·1	44·4	89·0	46·7	45·6	44·4	92	8	·09	S.
16	30·44	48·6	31·5	89·8	34·9	33·7	31·8	88	0	·01	W.
17	30·34	45·6	31·8	78·3	37·9	36·4	34·3	87	8	·37	S.E.
18	29·94	46·5	37·3	86·9	40·2	40·0	39·7	98	10	trace	S.
19	30·07	43·8	32·4	79·2	36·5	35·5	34·1	91	7	·02	N.W.
20	·24	50·3	33·7	55·4	40·4	39·9	39·3	96	10	trace	N.W.
21	·43	52·2	39·6	62·7	46·8	45·6	44·3	92	10	trace	S.W.
22	·42	53·6	46·2	80·0	49·6	48·4	47·1	92	10		S.W.
23	·80	49·6	31·6	93·3	39·9	37·4	34·1	80	1	trace	W.
24	·67	54·0	33·7	91·5	39·8	39·6	39·3	98	10	trace	W.
25	·67	50·1	39·8	89·2	42·1	42·1	42·1	100	10		N.W.
26	·63	44·8	36·6	62·9	38·9	38·9	38·9	100	10		N.W.
27	·46	49·2	36·0	83·1	41·9	39·9	37·4	84	10	·03	S.W.
28	30·50	53·6	40·9	92·1	46·9	46·5	46·1	97	10	·06	N.W.
Mean	30·05	49·0	36·4	76·4	41·1	39·1	39·1	93	7·6	Total 4·11	

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	30·42	48·6	43·0	87·1	46·1	44·8	43·4	91	7		N.
2	·60	43·1	37·5	70·5	39·1	37·0	34·3	83	10		N.
3	·63	49·2	31·3	88·1	38·3	37·0	35·2	88	0		N.
4	·65	48·0	26·5	83·4	35·2	34·3	32·9	91	0		N.E.
5	·58	55·4	25·6	94·5	34·5	32·7	31·3	81	1		N.E.
6	·21	40·5	25·6	83·6	36·9	35·2	33·8	85	10	trace	N.
7	30·01	40·5	28·8	75·1	33·6				8	·01	N.
8	29·72	36·5	24·9	84·3	30·1	27·6	19·7	63	1	trace	N.
9	·93	36·0	24·2	91·0	29·9	27·7	20·8	67	2		N.
10	·85	35·8	21·3	84·6	29·9	27·8	21·2	68	2		N.
11	·71	39·9	21·6	76·6	32·9	30·6	26·0	74	9		N.
12	·80	39·2	25·6	92·7	30·9	28·1	20·5	63	1		N.
13	·92	42·7	24·7	89·4	34·1	29·6	21·6	58	1	·01	N.
14	·74	44·7	32·3	94·4	33·9	32·9	31·1	89	10		W.
15	·59	37·7	30·3	70·1	32·8	29·8	23·8	68	9		N.
16	·59	40·2	21·5	92·0	31·9	29·1	22·6	67	6		N.W.
17	·53	47·3	31·3	103.1	39·4	36·4	31·1	76	3	.13	S.W.
18	·58	45·3	27·2	89·6	31·4	31·2	30·7	97	5	trace	S.W.
19	·75	43·5	25·4	88·0	35·1	33·6	31·2	85	10	·41	N.E.
20	·62	39·2	32·8	47·8	37·9	37·3	36·5	93	10	·01	N.E.
21	29·59	40·7	35·8	56·5	38·4	36·6	34·1	85	10		N.E.
22	30·01	34·7	28·5	88·1	29·6	27·3	19·5	66	9		E.
23	30·09	39·6	25·4	91·1	31·1	27·1	16·3	52	1		N.E.
24	29·94	46·5	16·6	91·3	28·4	26·9	21·1	73	9	·01	N.E.
25	·79	43·7	23·5	90·7	33·9	30·3	23·9	66	10	·04	N.E.
26	·22	44·5	31·2	96·1	34·9	32·1	27·6	73	10		N.W.
27	29·43	42·0	20·0	93·2	31·9	30·8	28·3	86	10	·02	N.W.
28	30·01	44·7	23·5	95·9	33·4	32·0	29·3	85	1		N.W.
29	30·07	46·6	28·4	100·2	41·0	35·1	27·6	59	9	·10	S.W.
30	29·43	52·2	40·7	89·6	46·4	45·9	45·3	97	10	·18	S.
31	29·86	54·3	30·5	100·4	45·9	41·1	35·6	68	1		W.
Mean	29·90	43·3	27·9	86·4	35·1	32·9	28·5	77	6·0	Total ·92	

Snow fell on the 6th, 7th, 8th, 10th, 11th, 15th, 18th, 24th, 25th & 27th.

APRIL.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	%	0—10	In.	
1	30·23	55·5	29·0	101·7	44·5	40·1	35·1	70	2		N.W.
2	·10	63·9	27·0	102·2	47·9	42·1	35·7	68	0		S.
3	·20	62·8	34·8	103·0	54·9	50·2	45·7	71	0		S.
4	·24	62·9	39·9	107.3	49·7	49·0	48·2	95	10		S.
5	·28	66·2	35·6	105·0	51·9	47·2	42·4	70	1		S.
6	·49	56·7	40·2	102·0	44·7	41·1	36·9	74	4		N.E.
7	·60	54·5	29·9	97·5	41·1	38·2	34·5	77	2		N.E·
8	·52	53·9	32·2	87·9	41·2	34·3	25·6	53	10		N.E.
9	·41	59·6	25·0	99.3	44·0	42·9	41·6	92	0		N.E.
10	·39	50·0	33·6	103·0	43.1	39·1	34·3	71	8		N.E.
11	·33	57·5	26·9	95·2	40·9	38·7	35·9	82	10		N.
12	30·22	54·6	36·0	96·0	44.6	43·7	42·6	93	10		N.
13	29·93	44·6	39·8	57.1	41·3	39·4	37·0	85	10	·01	N.
14	·87	55·0	39·7	85·2	43·9	43·9	43·9	100	10		W.
15	29·91	57·1	35·5	102·0	48·2	44·7	40·9	76	9		N.W.
16	30·05	54·2	38·9	109·9	47.9	42·0	35·5	63	4		N.W.
17	30·04	54·6	31·2	98·5	49·5	42·6	35·2	59	8		S.W.
18	29·67	61·0	41·2	107·8	53·8	48·1	42·5	66	6	·29	S.
19	29·70	52·3	42·3	91·2	43·0	42·5	41·9	96	10	·10	N.W.
20	30·07	58·7	40·3	109·9	49·1	45·6	41·9	77	1	trace	N.
21	·22	50·1	39·3	91·5	46·9	43·1	38·8	74	9		N.E.
22	30·20	50·8	34·5	100·8	48·5	39·6	35·0	72	9	·01	N.E.
23	29·87	46·0	36·0	98·2	38·8	36·0	32·3	77	9	·06	N.E.
24	·68	48·6	30·4	96·1	37·9	36·3	34·1	86	10	·04	N.
25	·63	52·0	33·5	101·3	44·8	39·9	34·2	67	5	·01	N.W.
26	·74	58·8	33·7	109·5	51·8	45·2	38·5	61	1		S.E.
27	·43	55·4	47·6	95·9	52·9	49·0	45·1	75	10	·52	E.
28	·45	58·4	47·3	100·6	49·6	49·0	48·3	96	10	·09	S.E.
29	·48	59·7	47·1	106.8	50·1	48·4	46·6	88	10		S.E.
30	29·71	59·5	38·4	114·3	52·4	46·6	40·7	65	6		W.
Mean	30.02	55·8	36.2	99·2	46·5	43·0	39·0	76	6·5	Total. 1·13	

Snow fell on 23rd.

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb	Wet Bulb.	Dew Point.	Relative. Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	29·72	60·2	40·2	105.7	47·6	45·0	42·1	82	10		N.E.
2	·90	47·3	40·6	88·3	42·1	38·8	34·7	75	10	0·1	N.
3	·84	51·5	33·3	103·1	44·8	40·0	33·4	67	9		N.
4	·84	48·6	28·4	100·2	40·8	35·2	28·0	59	7		N.
5	·84	53·7	28·5	106·3	38·0	35·3	31·6	77	10	·01	N.
6	·87	65.5	32·6	106·7	51·4	47·9	44·3	77	9	·04	N.
7	·69	57·0	42·2	98·4	44·9	44·3	43·6	95	10	·15	N.E.
8	·59	47·8	37·3	63·5	44·9	44·5	44·0	97	10	·33	S.E.
9	·53	48·6	39·6	83·2	44·9	43·4	41·6	89	10	·39	N.E.
10	·61	47·5	32·6	98·2	35·9	35·6	35·1	97	10	·05	N.
11	·90	50·9	35.2	101·8	47·5	42·9	37·8	69	7	·38	W.
12	·84	57·3	40·0	102·5	50·9	50·4	49·9	97	10	·03	S.
13	·98	65·7	49·8	110·4	56·5	52·2	48·0	74	7	·01	S.
14	29·92	58·7	49·7	108·1	55·1	53·6	52·1	90	10	·03	S.
15	30·01	65·2	47·9	113·7	57·7	54·1	50·7	78	3		N.E.
16	·31	71·8	47·5	117·9	63·8	56·0	49·6	60	2		N.
17	·41	68·3	42·0	111·6	60·2	51·7	44·2	56	1		N.
18	·30	60·4	45·3	105·3	53·7	47·8	42·0	65	9		N.W.
19	·07	60·7	47·1	115·3	53·0	48·6	44·2	72	10	·01	N.W.
20	·07	63·7	46·9	99·7	49·4	48·3	47·1	93	10	·02	W.
21	·20	64·1	43·3	120·3	55·4	50·1	45·0	69	3		S.E.
22	·19	69·1	38·2	118·8	61·2	51·3	42·7	51	0		S.E.
23	·19	74·1	45·5	118·4	65·4	55·9	48·1	54	1		S.
24	30·13	74·4	49·2	112·4	61·1	54·9	50·3	70	0		S.
25	29·98	73·5	43·8	123·3	62·0	55·7	50·2	66	3	·02	S.
26	·64	64·1	41·6	9[illegible]·8	55·7	54·7	53·8	93	10	·59	N.
27	29·99	63·3	43·4	114·0	52·3	47·7	43·0	71	1		N.W.
28	30·08	64·6	41·4	113·8	57·0	49·5	42·6	59	3		S.
29	·04	64·5	45·6	108·4	60·4	55·8	51·8	73	9		S.
30	·22	63·7	42·3	104·5	56·1	50·6	45·5	68	2		S.W.
31	30·26	66·2	40·8	122·0	60·8	51·8	41·9	54	2		S.
Mean	29·97	61·0	41·3	106·2	52·6	48·2	43·8	74	6·4	Total. 2·07	

JUNE.

Date	Baom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	30·07	70·8	39·6	124·7	61·3	51·8	43·6	52	7		S.
2	·13	71·3	43·9	124·5	61·8	55·7	50·4	67	1		S.
3	30·20	71·1	43·9	107·4	63·7	55·7	49·1	59	0		N.E.
4	29.82	73·7	45·1	116·1	54·5	51·8	49·2	82	9		N.
5	·90	71.5	47·6	118·5	60·8	52·2	44·7	56	1		N.E.
6	·87	68·6	42·6	110·6	55·7	49·7	44·1	65	0	·05	N.
7	·80	59·7	47·7	106·2	48·8	48·4	48·0	97	10		N.
8	·84	67·6	48·2	121·9	58·0	53·7	49·8	75	9		N.
9	·92	66·5	47·7	112·3	61·3	55·5	50·5	68	8	·05	N.E.
10	29·99	67·8	44·0	114·9	59·2	55·7	52·6	79	9		N.
11	30·15	60·5	50·4	101·2	52·9	50·5	48·1	84	10		N.
12	·35	69 8	32·7	116·1	59·1	54·3	50·0	72	0		N.
13	·45	76·1	50·7	116·4	64·0	57·9	52·8	67	9	·12	N.
14	30·33	71·7	53·0	123·5	62·6	58·8	55·6	78	9		N.
15	29·97	57·2	50·0		56·6	52·3	48·3	74	10	·20	N.W.
16	·86	59·4	42·2	110·3	50·8	46·7	42·4	74	8	·07	N.W.
17	·96	71·5	38·2	122·3	52·0	46·3	40·5	66	7	·01	W.
18	·98	62·3	43·7	117·3	55·9	50·0	44·5	66	8	·01	O.
19	·95	60·8	43·7	105·0	53·7	50·6	47·6	80	9	·02	N.W.
20	·85	61·7	46·5	116·0	52·1	50·6	49·1	90	10	·69	S.
21	29·91	63·7	50·0	121·3	56·9	53·4	50·2	78	8	·18	S.
22	30·06	61·9	45·8	108·3	55·5	52·0	48·7	78	9	·01	W.
23	·05	67·2	49·1	117·4	57·4	52·0	47·1	69	7	·09	S.
24	30·02	78·3	56·0	113·2	60·0	58·6	57·3	92	10		S.
25	29·88	71·5	50·3	126·3	65·9	60·0	55·2	69	9		S.
26	·79	61·9	50·0	115·4	56·8	51·9	47·4	71	9	·19	S.
27	·96	61·7	48·6	108·3	59·3	54·0	49·3	70	10	·15	S.W.
28	29·94	71·2	55·0	121·8	60·1	58·9	57·8	93	10		S.
29	30·08	81·6	56·1	131·0	70·8	64·9	60·4	70	8		S.
30	30·06	74·5	60·7	125·8	70·6	65·0	60·7	71	5		S.E.
Mean	30·00	67·8	47·4	116·3	58·6	54·0	49·8	74	7·1	Total 1·84	

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	30·15	71·5	48·4	120·0	64·2	58·7	54·1	70	7		S.E.
2	30·13	79·2	53·3	128·1	67·7	61·5	56·6	67	9	·09	S.
3	29·93	78·1	60·1	121·9	66·9	64·8	63·1	88	9		S.W.
4	·89	66·7	51·4	118·7	57·9	55·8	53·9	87	10	·04	S.W.
5	·93	67·8	50·4	120·4	59·8	56·0	52·7	77	7		S.W.
6	·89	69·3	49·6	113·2	63·5	56·1	49·0	61	9	·03	S.
7	·91	68·1	54·0	121·0	62.7	57·6	53·2	72	9		S.
8	·96	70·6	54·6	103·9	64·7	59·7	55·6	72	8	·04	S.
9	·86	69·6	56·1	115.8	61·1	58·7	56·6	86	10		S.W.
10	·97	68·7	51·1	124·1	61·9	56·6	52·0	71	3	·01	S.W.
11	·74	67·5	55·1	121·8	57·9	57·4	57·0	97	10	·02	S.
12	·65	62·7	55·2	107·0	59·7	55·5	51·8	75	10	·12	S.W.
13	·72	66·7	51·7	120·2	60·9	55·2	50·2	68	7	·02	S.W.
14	·80	63·9	51·0	115·7	59·0	55·6	52·5	79	8	·10	S,W.
15	29·89	63·3	43·7	122·4	54·9	49·4	44·1	67	6	·06	W.
16	30·18	63·5	40·2		57·0	51·2	45·9	66	10	trace	N.W.
17	·10	64·5	40·2	110·3	57·9	53·0	48·6	72	10	trace	W.
18	30·00	62·7	47·1	107·3	56·9	51·0	45·6	66	9		N.W.
19	29·83	65·4	44·3	126·6	57·7	52·7	48·2	71	3	·01	N.W.
20	·79	61·9	45·9	104·5	58·0	54·8	51·9	80	10	·33	S.E.
21	·64	61·1	51·0	108·5	58·8	53·4	48·5	69	8	·30	S.W.
22	·82	63·7	48·2	96·6	55·4	51·1	47·0	73	9	·01	W.
23	·86	60·7	48·3	107·4	56·2	52·8	49·6	79	8	·25	W.
24	29·79	64·0	50·0	113·0	55·3	50·6	46·1	71	9		N.
25	30·01	63·2	47·4	115·9	57·6	52·4	47·7	70	9	·04	N.W.
26	·13	64·5	49·4	113·7	56·9	53·8	50·9	81	10		N.W.
27	·19	62·0	45·3	100·1	57·2	54·2	51·4	81	10	·03	N.W.
28	30·15	70·8	48·4	114·9	56·0	52·8	49·8	80	9		N.
29	29·98	67·5	45·4	118·1	62·6	55·8	50·0	63	2	·05	N.
30	·65	65·3	51·6	122·0	58·9	55·4	52·3	79	10	·06	S.
31	29·74	68·9	52·0	118·5	59·3	57·9	56·6	92	10	·12	S.
Mean	29·91	66.6	49.7	118·4	59·5	55·2	51.4	75	8·3	Total 1·73	

AUGUST.

Date	Barom. Reduced	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	30·03	65·6	50·0	113·5	59·9	55·3	51·3	73	9		N.W.
2	·21	69·6	47·1	130·2	59·6	55·1	51·2	73	9	·06	N.W.
3	·27	67·3	53·7	109.2	57·9	56·2	53·8	89	10		N.W.
4	·27	72·2	51·0	114.6	55·2	55·1	55·0	99	10	·05	N.W.
5	·15	66·5	55·0	93·6	59·1	58·2	57·4	94	10	·03	S.W.
6	30·00	66.7	56·7	100·8	61·9	59·6	57·6	87	9		S.W.
7	29·98	69·9	52·0	119·2	60·2	55·3	51·0	72	3		S.W.
8	·91	60·9	47·3	104·9	58·8	54·1	49·9	73	10	·08	S.W.
9	·67	65·2	53·5	115·9	57·6	50·0	43·1	59	4		S.W.
10	·66	65·5	48·6	120·0	58·9	52·0	45·9	62	5		S.W.
11	29·92	66·7	49·3	117·8	61·6	54·8	49·0	63	7		S.W.
12	30·18	70·9	44·1	114·4	61·9	54·5	48·1	60	1		N.
13	29·82	77·8	54·0	121·0					0		S.
14	·85	71·0	58·2	124·5	64·0	59·1	55·0	73	7	·05	S.W.
15	29·72	65·0	55·0	114·2	60·2	60·0	59·8	99	6	·03	S.W.
16	30·04	64·4	49·9	116·8	55·2	55·2	55·2	100	9		N.W.
17	·10	67·2	47·8	111·0					10	·03	W.
18	·19	74·3	58·2	126·4	63·2	60·9	58·9	87	7		S.W.
19	·31	75·4	45·4	119·0	57·3	56·3	55·4	93	10		S.W.
20	·17	76·9	43·7	126·2	65·4	61·6	58·5	79	0		S.W.
21	·21	78·7	54·3	125·1	67·0	62·9	59·6	78	4		S.W.
22	·21	71·5	55·0	113·2	66·4	66·4	66·4	100	9		S.W.
23	·29	71·7	45·1	112·2	61·1	61·1	61·1	100	0		S.W.
24	·29	72·8	44·0	115·5	63·6	63·4	63·2	99	0	·01	N.E.
25	·21	75·2	46·1	115·8	59·9	58·9	58·0	94	7		N.E.
26	·16	76·1	46·2	117·7	64·9	64·9	64·9	100	0		E.
27	.10	74·3	50·1	125·5	64·1	64·1	64·1	100	10		W.
28	30·06	73·0	57·0	118·6	65·9	65.7	65·5	99	4	·01	S.W.
29	29·88	69·4	56·2	103·4	64·1	64·1	64·1	100	10		S.W.
30	·96	68·2	51·4	120·6	59·9	59·9	59·9	100	10	.04	S.W.
31	29·81	61·9	53.3	122·7	59·3	55·4	51·9	77	7	.13	S.W.
Mean	30·05	70·1	50·9	116·2	61·2	58·6	56·4	86	6·4	Total ·52	

SEPTEMBER.

Date	Barom. Rueded.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point	Relative Humidity.	Cloud	Rain	Wind.
	n.	°	°	°	°	°	°	°/°	0—10	In.	
1	29·61	63·3	50·1	108·9	57·5	55·0	52·7	84	9	·22	S.W.
2	·89	60·7	54·2	91·3	56·6	55·2	53·9	91	10	·55	S.
3	·42	64·7	53·1	118·0	56·9	52·0	47·5	71	10		S.W.
4	·73	63·9	46·2	119·7	57·6	50·7	44·5	67	2	·14	W.
5	29·81	60·4	45·7	118·6	51·9	51·1	50·3	94	10		N.W.
6	30·01	57·0	39·8	83·4	49·4	48·4	47·3	93	10		N.
7	29·91	60·4	46·6	107·0	56·1	51·2	46·6	71	9		S.W.
8	29·90	65·8	50·2	113·7	58·9	55·2	51·9	78	10	·01	S.W.
9	30·17	67·9	37·3	90·6	57·1	52·4	48·1	72	0	·01	N.W.
10	·11	62·4	48·4	89·3	58·1	56·3	54·7	88	10	·23	S.
11	·04	57·4	51·0	77·4	53·5	53·5	53·5	100	10	·06	N.
12	·22	67·1	51·9	108·3	57·3	56·0	54·8	92	10	trace	N.
13	·31	66·3	52·9	106·6	55·9	54·8	53·8	93	10		N.E.
14	30·14	67·7	50·8	113·3	55·4	53·5	51·7	87	8		N.E.
15	29·97	67·9	50·6	111.5	54·8	53·0	51·3	87	10		N.E.
16	30·14	71·2	45·2	111·4	52·2	52·2	52·2	100	10		N.E.
17	·21	74·3	44·7	116·5	67·1	60·1	54·5	64	1		N.E.
18	·21	73·2	46·9	116·6	60·9	58·2	55·9	84	0		S.W.
19	30·15	73·0	53·6	118·7	59·9	58·4	57·1	91	6	·03	S.W.
20	29·76	64·2	53·4	90·7	56·2	54·8	53·5	91	10	·11	S.E.
21	·72	63·8	43·3	106·9	53·1	53·2	53·1	100	10	·01	S.E.
22	29·68	60·4	46·9	86·3	54·4	53·8	52·2	96	10		S.E.
23	30·06	65·7	39·6	114·3	54·9	52·7	50·6	85	9	·30	S.E.
24	29·69	67·4	52·6	109·4	58·6	57·2	55·9	91	10	·02	S.
25	·81	66·4	53·8	109·9	59·9	57·0	54·5	83	5	.15	W.
26	·71	66·4	52·5	114·7	62·0	60·8	59·7	93	9	trace	S.W.
27	·70	63·8	51·0	101·1	58·0	53·9	50·2	76	8	·06	S.W.
28	·85	61·3	47·9	108·2	54·2	51·7	49·3	83	2	·35	S.W.
29	·32	56·0	45·3	102·9	50·3	47·2	43·9	80	7	·50	S.W.
30	29·37	53·0	47·9	80·2	49·9	49·2	48·4	95	10	·05	N.W.
Mean	29·89	64.7	48·4	104· 8	56·8	54·0	51·8	86	7·7	Total 2·80	

OCTOBER.

Date	Barom. Reduced.	Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud	Rain	Wind.
		Thermometers.									
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	29·73	53·3	44·6		47·8	44·8	41·5	79	8	trace	N.
2	30·00	52·4	37·7		45·0	41·6	37·7	76	1	·12	N.W.
3	29·71	48·3	43·5		46·2	45·6	44·9	96	10	·41	W.
4	29·54	53·6	38·4		48·1	46·0	43·7	86	10	·01	N.W.
5	30·11	53·3	38·5		47·0	42·8	38·1	72	2	trace	N.W.
6	·20	59·1	35·4		47·9	45·1	42·0	80	1		N.W.
7	·45	56·2	35·3		43·8	43·2	42·5	95	8		N.W.
8	·53	59·6	42·7		54·8	54·0	53·2	94	10		N.
9	·43	58·7	51·0		52·9	52·1	51·3	94	10		W.
10	30·08	63·1	41·4	104·2	45·9	45·8	45·7	99	10		W.
11	29·88	60·0	45·1	94·9	49·1	49·1	49·1	100	10		N.W.
12	30·07	55·5	44·4	81·8	49·7	48·5	47·2	92	9		N.E.
13	30·06	59·7	36·9	88·5	46·6	46·6	46·6	100	10		S.
14	29·83	63·7	46·7	109·1	57·0	54·3	51·8	83	7	·48	S.
15	·77	60·3	45·6	102·5	51·9	49·8	47·7	86	1	·42	S.
16	·42	58·4	47·9	93·7	55·9	52·0	48·3	76	8	·07	S.
17	·49	60·1	49·7	100·9	53·8	48·8	43·9	69	1	·12	S.W.
18	·97	54·2	41·3	100·1	46·1	43·1	39·7	79	1	·02	S.W.
19	·95	56·2	45·1	57·4	48·2	47·6	46·9	96	10	·14	S.
20	·73	50·9	44·2	91·3	45·4	43·3	40·9	85	9		S.W.
21	29·82	55·4	37·2	100·1	45·9	43·2	40·1	81	0	·01	S.W.
22	30·01	50·8	36·5	91·7	42·0	41·3	40·5	95	10	·09	N.
23	29·75	58·7	35·9	86·7	50·7	49·1	47·4	89	9	·03	S.
24	·83	57·9	43·2	73·0	48·8	46·7	44·4	86	9	trace	S.
25	29·80	60·9	48·1	73·1	57·8	54·8	52·1	81	10	trace	S.W.
26	30·03	58·8	53·2	76·9	55·3	53·8	52·4	90	10		S.
27	·04	61·3	48·1	101·2	53·0	52·6	52·2	97	9	trace	S.
28	·23	59·8	39·6	101·7	49·6	49·6	49·6	100	10	trace	S.
29	·22	55·3	45·6	56·2	51·5	51·5	51·5	100	10	trace	S.
30	·42	52·3	47·1	60·0	49·4	48·8	48·1	96	10		N.E.
31	30·33	50·0	45·8		47·9	46·0	43·9	87	10	Total 1·92	E.
Mean	29·98	56·7	43·1	87·9	49·5	47·8	46·0	88	7·8		

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain	Wind.
	In.	°	°	°	°	°	°	%	0—10	In.	
1	30·26	53·1	44·1	88·1	47·8	45·0	41·9	80	9	·01	N.E.
2	·19	47·2	41·7	55·5	43·7	43·1	42·4	95	10	·01	N.
3	30·03	48·0	42·6	56·7	43·9	43·7	43·5	98	10	·01	N.W.
4	29·90	51·7	34·7	69·3	44·9	44·1	43·1	95	10	·31	S.W.
5	·70	54·8	38·2	87·5	43·9	41·5	38·6	82	0	·26	S.W.
6	·01	56·5	38·2	75·1	53·7	52·1	50·5	89	9	·05	S.W.
7	·56	49·6	29·2	82·0	33·0	32·9	32·7	99	7	·08	S.E.
8	·70	51·4	32·5	92·1	37·0	37·0	37·0	100	10	·02	S.
9	·69	53·5	36·2	92·9	49·0	47.0	44·8	86	9	·01	S.W.
10	·62	45·7	36·8	88·8	39·0	37·7	36·0	91	8		S.W.
11	·82	46·5	37·3	79·1	40·9	38·9	36·4	84	4	·06	W.
12	29·77	45·0	35·5	85·6	37·6	36·8	35·7	93	8		N.E.
13	30·01	45·0	25·2	78·0	30·1	29·8	28·8	95	4		W.
14	·20	42·4	25·6	60·3	31·9	31·4	30·2	93	8		N.
15	30·03	46·8	25·2	74·3	29·7	29·2	27·5	91	4	·26	S.W.
16	29·67	48·6	29·7	62·5	46·7	45·6	44·4	92	10	trace	S.W.
17	·79	48·6	33·4	76·2	41·2	40·1	38·7	91	10	·17	S.E.
18	·96	50·9	33·1	86·1	36·9	35·1	32·6	84	3	·04	W.
19	·94	50·4	35·8	86·2	45·2	43·9	42·4	92	7	·09	S.W.
20	·92	49·3	38·0	87·0	43·5	42·1	40·4	89	10	·05	S.W.
21	·94	53·5	37·6	92·1	48·8	46·8	44·6	86	8	·01	S.W.
22	·84	49·4	39·2	75·7	45·6	43·2	40·5	83	7	·14	S.E.
23	·75	46·7	32.5	81·0	35·7	35·3	34.7	96	1	·37	N.W.
24	·53	53·2	34·5	86·4	45·8	44·2	42·4	89	1	·40	S.
25	·10	58·9	44·8	69·1	53·1	52·2	51·3	94	10	·24	S.W.
26	·11	51·6	44·2	83·8	45·7	44·6	43·4	93	6	trace	S.
27	29·89	51·5	35·8	82·8	38·9	37·7	36·1	89	8		S.W.
28	30·29	56·7	38·9	88·1	51·1	50·1	49·1	93	10	trace	S.W.
29	·35	50·2	39·3	82·1	41·1	40·9	40·6	98	4	trace	S.
30	30·25	41·5	38·2	80·8	44·9	44·5	44·0	97	9	·11	S.W.
Mean	29·83	50·2	35·9	79·5	42·3	41·2	39·8	91	7·0	Total 2·70	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud	Rain	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	30·25	44·1	38·8	68·2	41·5	39·1	36·1	81	9		N.
2	30·22	44·8	32·3	51·7	41·9	41·2	40·4	95	10	·02	S.W.
3	29·95	53·8	37·3	53·2	43·0	41·9	40·6	91	10	trace	S.W.
4	29·71	41·9	35·8	72·1	37·5	34·0	29·1	72	2		N.W.
5	30·12	40·2	29·8	64·2	32·1	31·5	30·1	92	7		N.
6	·05	34·2	28·6	66·3	31·9	30·6	27·6	83	9	·01	N.W.
7	·50	35·5	27·5	74·7	31·7	29·1	23·7	69	7		N.
8	·47	35·4	27·4	39·1	31·9	30·0	25·6	76	10	·01	W.
9	·27	44·1	30·8	46·7	32·7	31·7	29·6	88	9	·01	W.
10	30·00	48·6	31·5	62·6	43·6	41·8	39·6	86	8	·20	S.W.
11	29·67	49·8	41·5	81·6	43·3	40·8	37·8	81	2	·03	S.W.
12	·87	50·4	40·0	59·8	43·4	37·9	31·3	63	6	·01	N.W.
13	·98	53·6	37·2	75·7	50·4	48·0	45·4	84	10	·03	W.
14	·72	52·7	50·0	56·4	51·1	50·5	49·9	96	10	·02	S.W.
15	·85	45·3	36·5	74·7	38·4	36·7	34·4	86	5	·03	S.
16	29·69	38·9	34·8	72·9	36·0	34·2	31·5	84	8	·02	N.W.
17	30·30	38·5	32·5	63·8	34·9	33·6	31·5	87	9	trace	N.W.
18	·38	42·4	30·7	67·9	32·3	30·8	27·6	81	9		N.
19	·33	43·2	32·3	69·0	38·0	36·5	34·4	87	10		N.W.
20	30·06	46·5	33·3	53·1	41·8	41·1	40·3	95	10		W.
21	29·90	48·4	41·2	77·0	45·4	44·9	44·3	97	9		S.W.
22	29·93	48·5	39·1	63·8	43·9	42·9	41·7	92	6		S.W.
23	30·10	45·2	37·7	65·0	41·8	39·0	35·5	78	8		N.W.
24	·50	47·1	31·9	51·7	45·2	45·0	44·8	98	10	·01	N.W.
25	·55	40·7	39·2	46·5	39·9	39·9	39·9	100	10	·02	S.
26	·52	40·6	39·3	45·0	37·9	37·6	37·2	97	10	·01	S.E.
27	·42	38·9	34·3	40·0	35·9	34·8	33·1	90	10	·02	S.W.
28	·30	42·6	35·8	49·9	38·9	38·8	38·7	99	9	·05	S.W.
29	·24	40·5	38·2	43·7	40·0	39·9	39·8	99	10	·03	S.W.
30	·31	37·5	36·2	39·2	36·9	36·5	35·9	96	10		N.E.
31	30·45	36·5	33·7	40·0	34·9	33·6	33·1	87	10		E.
Mean	30·15	43·5	35·3	59·2	39·3	37·9	35·8	87	8·3	Total ·53	

Snow fell on the 6th and 16th.

Total rainfall for the year 22·69 in.

ENTOMOLOGICAL REPORT.

But little seems to have been done during the year 1883 in this branch of Natural Science, and compared with other years the result is disappointing. In 1882 seven new species, in 1881 nine, but in 1883 only *three* new specimens were added to our anything but complete list, and these by a stranger staying a few days in the neighbourhood. A series of prizes was most kindly arranged for collections of Lepidoptera by Mr. Lane, during last summer, but not even through these was the list added to. It is to be hoped that the observations in 1884 will be more numerous. Appended is a list of Mr. Blandford's observations.

Lithosia Mesomella	June 17.	Earliest date on record.
Euchelia Jacobeae	June 16.	
Ellopia Fasciaria	June 17.	
Boarmia Consortaria	June 17.	Earliest date on record.
Tephrosia Extersaria	June 16.	Not previously recorded.
Eupithecia Exiguata	June 17.	Never previously observed.
Mamestra Furva	June 18.	Not previously recorded.

Of these *M. Furva* and *T. Extersaria* have been taken before but by some oversight have not been entered in our list.

J. C. INGLIS,

Entomological Album Keeper.

ZOOLOGICAL REPORT.

The following is the Report for 1883, of the first appearance and first song of Birds observed in the Neighbourhood of Wellington College. For most of these observations the Society is greatly indebted to Mr. Davenport, Mr. Newall and Gorringe mi.

No observations in January.

February.

	First Song	
Lark	3rd	Continued singing through the month
Thrush	4th	,, ,, ,,
Fieldfare	7th	Kept in flocks and sang through the month.
Chaffinch... ...	5th	Continued singing through the month
Green Woodpecker	18th	,, ,, ,,
Yellow Hammer...	20th	Did not sing, but was observed.
Greenfinch ...	22nd	Sang occassionally through this month.
Bulfinch	23rd	Sang all through the month.
Blackbird ...	24th	Continued singing through the month
Missel Thrush ...	25th	,, ,, ,,

A flock of about 10 Siskins were seen down by the Baths, resting on the trees, but departed on the same morning (*i.e.* 23rd Feb.)

One species of the Bohemian Waxwing, a bird very rarely seen in this country, appeared near the College on 24th of February, it stayed through the month, and was always observed eating the holly berries, which comprise its food, close to Richardson's Lodge. It then disappeared for a while, but appeared again on the 4th of March. This bird has not been seen here before this for several years.

March.

Bulfinch	12th	In a considerable number.
Plovers	12th	ditto ditto.
Tree Pip ...	12th	Not singing.

APRIL.

Swallow ...	...	13th	was first seen.
Cuckoo ...	...	19th	was heard.
Nightingale	...	29th	was heard singing.

MAY.

Nightingale	...	2nd	was heard singing again.
Sandmartin	...	3rd	was first seen.
Red Backed Shrike		15th	was first seen at Owlsmoor.
Swift ...	...	16th	first seen near Wokingham.
Spotted Flycatcher		23rd	first seen near the College.

The song of the Thrush was heard at intervals during October, November and December.

F. GREEN-WILKINSON,

Zoological Album Keeper.

ETHNOLOGICAL REPORT.

The following additions have been made to the Society's collection during the past year.

An elaborate specimen of penmanship executed by a Hindoo scribe.

Presented by H. A. F. Magrath.

Some leaves of paper covered with Arabic writing, picked up on the field of Tel-el-Kebir.

Presented by Col. Fraser.

Three very interesting letters written by the great Duke of Wellington. Dated 1809, 1835, and 1851.

Presented by The Lady Rose Weigall.

A Spanish dollar. Presented by an anonymous donor.

A one cent piece of new coinage for North Borneo.

Presented by C. H. Sanctuary.

A one centesimo piece of Victor Emmanuel II.

Presented by C. H. Cayley.

F. G. MACKENZIE,

Ethnological Album Keeper.

FIFTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1884.

"Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης."

Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1885.

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WELLINGTON COLLEGE.
GEORGE BISHOP.

1885.

Contents.

PREFACE.

The Fifteenth Annual Report presents no new features which call for any special comment.

The observations conducted by the Society have been carried on during the year and the more important of them are published in detail. The readings of the thermometers and other Meteorological instruments were taken during the earlier part of the year by A. C. Campbell and afterwards by R. S. Heywood to both of whom we are much indebted.

The list of the Society this year for the first time includes the name of a lady. Mrs. Pender, who is well known in connection with the most valuable of the Society's prizes, has allowed her name to be enrolled among the Corresponding Members.

RULES.

1. That this Society be called the "Wellington College Natural Science Society.

2. That the Society consist of Honorary Members, Corresponding Members, Members, and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary, and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of Management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Assocaites elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers to be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

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VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD.

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TREASURER { N. C. MACLEOD. E. W. STAFFORD

ALBUM KEEPERS.

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GEOLOGICAL—G. WALTER.
ZOOLOGICAL—G. F. GORRINGE.
BOTANICAL { A. SPENCER-WELLS. J. L. PEARETH.

METEOROLOGICAL { A. D. W. POLLOCK. R. S. HEYWOOD.
ENTOMOLOGICAL { J. C. INGLIS. J. S. MARRINER.

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B. W. CONSTABLE
H. RUSSEL
E. RICKARDS
P. E. L. CUST
A. B. WARD
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T. E. CASE
H. V. RIDDEL
G. WALKER
H. C. H. BURTON
E. de G. DAVIS

* Left Lent Term, 1884. † Left Easter Term, 1884. ‡ Left Michaelmas Term, 1884.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College	...	N.H.S.
Cheltenham ,,	...	N.H.S.
*Marlborough ,,	...	N.H.S.
Clifton ,,	...	N.H.S.
*Rugby School ...	...	N.H.S.
*Dulwich College ...	...	N.H.S.
*Haileybury ,, ...	...	N.H.S.
*Kings Edward's School, Birmingham		N.H.S.

*U. S. Geological Survey.

Linnean Society.

Royal Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	2	4	11
Subscriptions:			
Lent Term—Honorary Members ...	1	9	6
,, ,, Members and Associates...	4	11	6
Easter Term—Honorary Members ...	1	14	0
,, ,, Members and Associates	4	16	6
Michaelmas Term—Honorary Members	1	1	0
,, ,, Members and Associates	4	10	6
Grant from The Master	5	0	0
Sale of Report	10	7	6
	£35	15	5

Examined and found correct, S. A. SAUNDER,
Dec. 16, 1884.

Expenditure.

	£	s.	d.
New lecture Apparatus	8	5	0
Limes, Carbons & Repairs to Electric Lamp	1	2	9
Refilling gas jars		15	0
Acid for battery	1	2	8
Hire of slides		5	10
Laboratory Assistant for charging battery		4	6
Perkins for reading thermometers &c. during holidays	1	0	0
Setting boards and other entomological apparatus		15	3
Blank Forms for Meteorological Observations		2	6
Engraving the Pender Prize		5	0
Carriage of Parcels	1	0	4
Stamps		12	0
Bishop, for printing Report, &c.	15	9	10
Balance in hand	9	14	9
	£35	15	5

E. H. W. H. STAFFORD, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 9th.

The Rev. P. H. Kempthorne read a paper on "Tricycling in the Lowlands of Scotland."

The lecturer anticipated a rapid extension of the use of the Tricycle for tours. He pointed out the facilities which this method of locomotion offers for the exploration of once frequented but now obscure parts of the country. The observant Tricyclist would be able to note many ancient monuments, churches and other works of ancient art, which lie near the railway perhaps, but almost as much out of reach of the ordinary traveller as if they were in the furthest corners of the country. He shewed that many characteristic local features of language, dress, and manners, now rapidly disappearing might be observed with advantage. He was convinced that for the enjoyment of scenery and for geological observation the Tricycle afforded unequalled opportunities. His route began at Carlisle, took him through the valleys of the Esk, Teviot, Yarrow, Moffat, Clyde and Almond, and eventually closed at Edinburgh.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Goodchild.

Saturday, February 23rd.

The Rev. W. F. Short gave a lecture on "Antique Gems and Seals, their History, Materials and Art."

The lecturer began by a notice of the earliest form taken by the engraving art; this is to be found in the signets of Assyria, which however are not rings, but simple cylinders of hard stone, with distinguishing marks cut upon their outer surface. When rolled upon clay they left this individual impression, which

could thus be used as a means of identifying property, or of securing places to which none but the owner was to have access. These cylinders were habitually worn suspended by string from the wrist or round the neck. Two specimens, dating presumably from the age of Abraham, or even earlier, were shown. Contemporaneous with, or possibly earlier than these were the 'Scarabaei' or Beetle stones of Egypt, which exist in large numbers, and the origin of whose shape is variously explained, the most probable theory being that this particular insect was selected owing to its being used as an emblem of the sun.

It was probably through the Phoenicians that the engraving art passed into Greece; at the same time the original habit of wearing the cylinder ceased, and it became the fashion to have the stone set in a ring or other substance, and worn upon the finger. The method of cutting the stone was improved, the diamond point being now used for this purpose.

The lecturer then gave a short sketch of the history of the art in Greece, pointing out with various examples the steps by which perfection was reached. The period of greatest excellence coincided generally with that in which sculpture also attained its highest development. It was further shewn how immensely valuable the study of gem cutting is as an illustration of the latter art, owing to the common practice of reproducing famous statues in miniature on signet rings, which from the greater durability of their material have remained to us absolutely uninjured after the statues themselves have perished.

Native art died away in Greece when the country passed under the dominion of Rome; the practice of gem cutting however continued in the latter city, where the universal habit of wearing a signet ring afforded ample scope for its exercise. The substitution however of the wheel for the diamond point caused a deterioration in the character of the work, though it increased its rapidity. To this age belong many portraits; these however being usually unsigned, can very rarely be authentically ascribed to any one original. Towards the end of the first century of the empire however the art began to decline, and by the fifth had practically become extinct; remaining in the position of a lost art until revived by the Italian artists of the fifteenth century.

At the conclusion a vote of thanks to the lecturer was proposed by The Master.

Saturday, March 8th.

H. F. Newall, Esq. gave a lecture on "Some Experiments in Sound."

A tuning fork struck or stroked properly is set into a peculiar

state of motion, the tip of each of the prongs moving more or less rapidly backwards and forwards over the same path, and similarly with other parts of the prongs, but in smaller and smaller degree as the base is approached. This motion can be perceived in several different ways. I can *see* the tremour of the fork: I can *feel* it by touch, and we can *hear* it. How is it that we can hear it?

The prongs in their motion set up in the air round about them a peculiar movement, which we call vibration. Starting from the prongs as centre of disturbance, waves move outwards and beat upon everything around. If an ear is in the path of the waves, a certain part of it is set in motion, the nerve ends of the ear are stimulated, the stimulus is carried to the brain, and there by some unknown psychical process the sensation of sound is produced. It is my intention to shew you a few experiments bearing on the physical nature of sound, that is on Vibration.

First I will shew you the way in which a metal plate can be made to tell us the modes of its movement, when sounding. A brass plate, about $\frac{1}{16}$ of an inch thick and a foot square, is held at its centre by a double clamp, which also fixes it firmly to the table. If the plate is struck a jangle of sounds is produced. A great number of these may be 'killed' by touching the plate in particular points. In fact certain points may be chosen, so that all the tones but one are killed. This remaining one may be sustained and intensified by bowing the edge of the plate with a fiddle bow. If, when it is sounding, a knitting needle is held loosely on the plate, it dances up and down, and moves about until it comes to rest on certain lines on the plate. This shews that the plate is vibrating in some places and not in others. And we may shew the nodal lines, or lines of no vibration, all at once, by sprinkling dry sand on the plate. The sand like the knitting needle is danced about until it finds a place of rest between adjacent regions of the plate which are in opposite states of vibration, one going up whilst the other goes down. This is Chladni's experiment. For each tone, that the plate can be made to give, the sand shews a new figure: the higher the tone, the more complicated the figure.

Next I will shew you another mode of exhibiting vibrations and combinations of vibrations. This method was invented by Lissajous and produces beautiful effects. A straight spring is fixed in a vice at one end and has a small mirror attached to its free end. The spring in vibrating carries the mirror with it, and a beam of light thrown on to the mirror is reflected in a direction depending on the position of the mirror. This beam falling on a white screen illuminates a small part of it. When the spring and mirror vibrate, the spot of light moves backwards and forwards on the screen so quickly, that we cease to see it as a

spot of light moving, but we see a streak of light of the width of the spot of light, but of a length that depends on the violence of vibrations of the spring. Instead of sending the beam direct from the mirror on to the screen, it is made to fall on a second mirror attached to a second spring, which vibrates at right angles to the first, and it is then reflected from the second mirror to the screen. When both springs vibrate at once, the spot of light moves in curves of endless variety. A change in the relative positions of starting the vibrations of the springs, or a change in the relative rates of vibrations, will produce a change in the form of curve described by the spot of light; and the gradual dying out of the vibrations will be shewn by the gradual diminution in the size of the curves.

So far, I have dealt with the body that is the centre or promoter of disturbances. I will now shew you effects depending on the air round about the vibrator.

First to shew that the air is in motion :—A light straw needle with a paper disc at one end and a counterpoise at the other is carefully balanced on a horizontal axis. A tuning fork is made to vibrate and held near the disc. The disc is attracted. It is clear that something goes on between the disc and the fork, which does not go on, when the fork is not vibrating. A possible explanation of this strange fact is based on a principle, established mathematically and experimentally, namely, that *where velocity is greatest, pressure is least.* This startling result has led to experiments which are hardly less startling than the result of the theoretical reasoning. I will reproduce one or two of these experiments.

Two sheets of paper are suspended vertically and parallel about an inch apart, and a tube is inserted between them. I blow down the tube, and the sheets close together.

A tube is taken and fitted with a flange of cardboard, and a light bit of paper is held for a moment below the opening of the tube. I blow down the tube, and the paper instead of being blown away, seems to stick the harder, the harder I blow. When I cease blowing, the loose paper falls down.

The ordinary scent distributor, and the Bunsen gas-burner depend on this principle. And we apply it to explain the attraction of the disc by the vibrating fork in the followig way. The vibrating fork sets the air between it and the disc in motion. This motion is more violent on the side of the disc near the fork than on the remote side. Hence the pressure on the remote side is greater than on the near side. The disc consequently is pressed towards the fork.

Another illustration of the state of motion of air carrying sound through it, is afforded by certain gas-jets. I shew one coming from a glass nozzle carefully drawn out. It is fed from

a gas bag under greater pressure than is usual in gas pipes. The pressure is arranged so that the flame just does not 'flare,' but rises a steady jet of about 18 inches. Any sound near this tall jet makes it suddenly dip down to about half its original height. The flame is a '*sensitive*' one.

A few experiments will help to make the cause of this sensitiveness clear to you. Increase the pressure of the gas. Blow at the flame. Shake the tube that brings the gas to the fixed nozzle. Each of these disturbances makes the jet flare. In fact any cause, that tends to break the simple surface that bounds the flame, makes it flare.

Here again we are supported by the mathematical investigation of fluid motion. We learn that if two parts of a fluid, liquid or gaseous, divided by an imaginary plane, have motion relatively to one another, the motion will continue only so long as the dividing surface remains plane. If a sinuosity occurs, it tends to increase, till motion is destroyed in its original form. Such sinuosity in the surface dividing the gas flame from the air may be produced by sound waves meeting the surface, or by a breath of air blown upon it, or by the ricochetting of the gas in the tube before it comes out.

Another flame, that I have enclosed in a tube, shews sensitiveness in a very responsive way. When I sound the note of the tube surrounding the flame, the flame inside answers, taking up the note and sustaining it. It is called a '*sympathetic*' flame, because of this responsiveness.

The cause of the sustained note is to be explained in this way. The flame is a fluttering flame, and there is one particular rate of flutter that corresponds with the natural rate of vibration of the hot air in the tube; and just as soft taps on the bob of a very heavy pendulum produce, if rightly timed, by accumulation a large motion of the bob, so small flutters in the flame rightly timed and accentuated set up violent vibration of the air inside the tube; and hence the note. I induce the right rate of flutter by the note I sound and so the case is one of accumulating interaction.

A similar case is illustrated by the less musical howl of this tube in which is a piece of fine wire-gauze. The gas being lighted *above* the gauze only gives an extremely fluttering flame, and there is a similar action and reaction ending in the harsh howl that you hear. A more complicated series of causes is at work in producing the less rough but melancholy wail of the tube when air is passed through it, after the gauze is heated by a flame beneath it. One thinks instinctively of dogs and their incantations to a bright moon.

I will close my experiments with one illustrating the effect of a vibrating body on water jets. First let me shew you a

water jet in its natural state. It breaks up into drops of various sizes, and having various velocities, the consequence being that those with greatest velocity go further and higher; and the drops form a sheath of considerable width. If the drops all break off under the same conditions of size and velocity, the sheath appears to be bound together into one band of drops, which, though separated, appear to form a continuous band, by reason of their velocity and the fact that an image flashed on the retina takes appreciable time to die away.

Such a sameness of condition, as to size and velocity, in the breaking off of drops from the liquid column of the jet, may be produced by the vibrations of a tuning fork, which is made to touch the nozzle from which the jet comes. And we see the broad sheath of drops collect together into one narrow band, which looks like one continuous and unbroken jet, as often as the fork touches the glass nozzle.

My object in the lecture has been to shew some of the effects of vibrating bodies apart from the interpretation which we give to the vibration, when it reaches the brain through the ear and its nerves. I must then ask your indulgence, if some of these effects have been inseparably connected with screeching and howling noises rather than the melodious tones that might have been expected in a lecture on Sound.

At the conclusion a vote of thanks to the lecturer was proposed by The Master.

Saturday, March 22nd.

The Rev. Arthur Shadwell gave a lecture on "Ancient Rome Agreement of the Legends with the Stones."

The lecturer began by speaking of antiquarian research as illustrating history, and of the manner in which the ancient buildings in Rome seem to confirm the early legends. He proceeded to mention in order:—

1. The *opus quadratum*, massive masonry, consisting of large uncemented stones, found on the Palatine Hill at Rome and in the walls of several neighbouring towns. It exhibits a later stage of better finished work, sometimes cemented, dating from the time of Servius Tullius.

2. The *opus insertum*, stones laid in concrete, which is sometimes so hard that even dynamite will not destroy it. It is found in the garden of Sallust and at the Porta Capena.

3. The *opus reticulatum*, so called from its likeness to the

meshes of a net. It is made by inserting pyramidal pieces of stone into the face of concrete while still soft, and is neat and durable. Good examples exist on the Pincian Hill. It was used from the latter part of the republican era until the time of Hadrian.

4. The *opus latericium* or tile-work, of which there are so many examples in England. It was largely used in making aqueducts, and some examples are far the most perfect pieces of brickwork in the world, seeming quite indestructible.

5. The *opus mixtum*, consisting of a mixture of brick and stone, exhibiting a great falling off in the constructive art. Large masses of such masonry exist in the external wall of Rome, dating from the time of Nerva.

The various styles of masonry were abundantly illustrated by a series of excellent photographs exhibited on a screen by means of the lime-light; and at the end of the lecture allusion was made to the principal discoveries made in Rome during the last few years. The lecture throughout was illustrated by profuse quotations from the classics.

The Master, in proposing a vote of thanks, alluded to the recent death of his friend, Mr. Parker, who had taken a great part in the discoveries at Rome.

Saturday, May 17th.

Dr. P. H. Carpenter gave a lecture on "Starfishes and Sea urchins."

The lecturer first shewed on the screen some diagrams of star fishes, pointing out the five rays of which they all consist. These rays contain an internal series of hard limestone plates jointed together so as to admit of a slight movement.

In the centre of these rays is the mouth, whilst the whole of central disc is occupied by a capacious stomach. The starfish is very destructive to oyster beds many of which have been almost destroyed in a few days by an inroad of these Echinoderms. The starfish having found an oyster folds his arms about it with a firm grasp: he then protrudes a muscular ring at the entrance of his stomach through the circular opening which serves him for a mouth, and seizing the thin edge of the shell, little by little he breaks it off. As soon as a hole is made he pushes in the mouth of his stomach until it can seize upon the body of the oyster. As fast as this is drawn within its folds the great stomach is pushed further and further until in the end the starfish has fairly turned himself inside out.

In consequence of their destructive nature fishermen generally cut starfishes to pieces when they find them, but this only serves to increase the evil since on an average two out of three of these severed parts live, and develope into complete animals.

The mother starfish exercises a degree of watchfulness over her eggs which is quite unusual among marine animals of so low a grade. There is a well known story of a gentleman who removed the bunch of eggs from a starfish in his aquarium for examination and afterwards put them back again. To his surprise the starfish at once crawled towards them and gathered them into a cluster under her. Curious to test how far this apparently maternal solicitude was a reality he again took away the eggs and put them in a distant part of the aquarium. A second time the animal spread herself over them. Once more removing the eggs to the opposite end of the tank he set a piece of stone in front of them. The distressed mother immediately began to search for her lost treasures, and when after circling the obstacle, she seemed to catch sight of them, she made straight for the eggs and a third time wrapped them in her embrace. This incident is remarkable not only for the strong maternal attachment displayed, but also for the sharpness of eyesight it implies.

Some starfish carry their young about with them like the kangaroo. These young which are at first of microscopic minuteness are totally unlike the parent, and were known to naturalists long before their real nature was discovered. In shape they resemble a long bag with the end turned in, out of which after several curious transformations the five rayed form is ultimately developed.

Some diagrams of the brittle starfish were shewn upon the screen. This animal which has a large body and small arms has the power of hurling himself to pieces the moment he is disturbed and complete specimens are consequently difficult to obtain. They are commonly known as snake stars or sand stars and cause great trouble on the French and English coasts.

The arrangement in five parts which is conspicuous in the starfish is also found in the sea urchin or sea hedgehog. Some of these animals are covered with a flexible shell the small plates of which are jointed together by ligaments so as to resemble a coat of mail. They live in holes in rocks even in exposed parts of the shore, while the spines with which they are covered protect them from being eaten. They are well known in the fossil state, being very common in chalk beds.

After shewing a few drawings of sea cucumbers, animals resembling a cucumber in shape, with the mouth at one end, and which when irritated frequently exercise their power of turning themselves inside out, the lecturer passed on to the feather stars and sea lilies.

The feather stars when young grow on stalks from which they eventually break away, and pass the greater part of their existence lying on their back with their mouth upwards. The five arms which grow out of their bodies fork sometimes to over a hundred branches and these are generally turned upwards causing the animal to assume the shape of a cup, at the bottom of which is his mouth. The arms which form the sides of the cup are grooved on the top and the grooves are furnished with a number of cilia or fine hairs which perpetually lash the water, setting up currents by which any small creatures floating in it are carried towards the mouth and thus keep up the food supply.

These animals have the power of locomotion and when they swim all their right arms strike the water together followed by all the left arms.

The sea lilies which somewhat resemble them in appearance remain on stalks all their lives, and these stalks are often anchored by five hooks; sometimes the stalk breaks off at a joint, but just above the joint is another set of hooks by which the lily is again anchored to the bottom.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, May 31st.

The Rev. The Master gave a lecture on "A ten days' tour in Holland."

The interest of seeing Holland is fourfold. In the first place there is some interest to an Englishman in seeing a people which though so different in characteristics and in history are yet also so like in both respects to ourselves. Though not quite our nearest kinsmen on the continent they are near of kin to us, nearer than the Germans. They have that strange long enduring mark of kinship in the pronunciation of consonants. Their *ds ts*, *bs ps* correspond on the whole to ours, not to those of the Germans. When they speak English, as many do, they speak it with a better accent than other peoples. They are like us in physique; the common idea that a Dutchman is like one of his own cheeses, short and round, is a mistake, arising perhaps in part from the half comic portraiture of Dutch pictures. They are a fine race on the whole, well built and of good height—a Dutch regiment are head and shoulders taller than a Belgian regiment. They are like us in their tastes, born sailors at least as markedly as we are.

They have the same love of self government, and have fought as persistently and in the face of greater odds, for civil and religious freedom. They have a colonial empire which even now has a population some seven times larger than that of the parent country.

A second interest in a visit to Holland lies in the opportunity of becoming familiar with the great School of Dutch painters. The Dutch School does not stir the imagination or lift the thoughts as the great Italian painters do. It is not religious and it belongs to a land which does not suggest ideal beauty, but it has historical interest and force and charm of its own. It is the last of the great Schools, the only Protestant School; it is the School which gives the chief direction to the art of the Modern School. Its portraits may rank with those of the Venetians. In fact who can beat Rembrandt ? And there are other Dutchmen who press close on him such as Hals and Vandervelt.

Portraits, animal painting, landscape—the Dutch School is preeminent in all these as well as in the style which is oftenest associated with its name, pictures of humorous or pathetic incident in homely life. The favourite subjects are those which unite an element both of the tragic and of the humorous, as for instance, one they are never tired of, a man or woman having an interview with a dentist. Holland is the place to see the Dutch painters, to localise them, to understand them by seeing the backgrounds of their pictures, by seeing them on a larger scale than anywhere else till their names and individualites become distinct, but when they have done so you will find each of them represented by some of his very best pictures in the wonderful collection of Dutch pictures in our own National Gallery.

But the two greatest interests of a Dutch tour are the country and the great history of the people with the reminiscences of that history which meet you at every turn.

The country is the delta of the Rhine and here the sea plays two very important parts. First it throws up the sand into great mounds, called dunes, from forty to fifty feet high and often a mile or more deep. These are a protection but also a danger. Left to themselves they would be constantly drifted inland by the wind and would overwhelm any cultivation. This is diligently provided against by sowing them with reed grass and other plants to hold them fast. In the course of time they get firs to grow on them. On the other hand the sea encroaches, in storms and high tides, after a long continuance of West winds when the water is accumulated in the German ocean and cannot escape at once through the Straits of Dover. In this way the Zuider Zee was formed, or very greatly enlarged, by an irruption of the sea in the thirteenth century.

To make the country habitable the Dutch have, first to keep out the sea, partly by strengthening the natural barrier of the dunes and partly by dams of enormous strength, and secondly to drain the swampy soil. For this purpose the country is covered with a network of canals, often above the level of the land they traverse, into which the waste water from the deep trenches which drain the meadows is pumped. Thirdly, they have to reclaim large tracts which have been overflowed. Between Haarlem and Amsterdam an area of seventy two square miles is now covered with luxuriant grass where within the last thirty years was a great lake, while the indefatigable Dutchmen have long contemplated and have now begun a more gigantic work still, the reclaiming of the Zuider Zee. The dam which is already commenced will extend from Enkhuizen to Kampe, just below the influx of the Yssel, a distance of 25 miles. If this work is effected a new province will be added to Holland with an area of 687 square miles, about the size of Berkshire.

A Dutchman loves his land in a way that men of other nations can hardly understand. They labour at their land and improve it, but he has made it, and he has to fight for it constantly with the winds and waves. Yet there is one thing that he loves better. There is nothing more pathetic in Motley's soulstirring volume than the account of the way that the Netherlanders time after time cut the dykes and let in the sea on their meadows and homesteads, undid in a moment the toil of years as a last resource to relieve a bleaguered town or to gain a substantial advantage in their long and terrible struggle for liberty.

So we come to the second supreme interest of a visit to Holland; there are some points in which the most flying visit helps one to realise the incidents and characteristics of the great struggle narrated by Motley. You see at once what was the initial weakness of the Netherlanders, that which so often wrested victory from their grasp. It was the crowding together in that small space of such utterly diverse temperaments, conflicting interests, headstrong and turbulent tempers. A strong power might have welded them into a nation, but of their own accord they could not act together, even against a common enemy, for many months at a time. You realise more vividly than before the amphibious character of the warfare, while you see also on every side proofs that the struggle did for the phlegmatic Dutchman what the Persian war did for the more finely gifted Athenian—woke up all his faculties. All the finest buildings date from the time of the war or immediately after it, all the great painters are of the same date.

You see lastly that the popular instinct of Dutchmen has never doubted who amongst their heroes should hold the first

place in their grateful memory, all the national memories centre round the great hero of Motley's book, William the Silent.

At the conclusion a vote of thanks to the lecturer was proposed yb Mr. Kempthorne.

Saturday, June 14th.

The President gave a lecture on "Iceland."

Whether or not Iceland was known to the Ancients is a question which has given rise to a good deal of discussion. Strabo tells us of a land beyond Britain which he calls Thule, but whether this was Iceland, the Faroë islands, the Shetlands, the Orkneys or the Hebrides has never been decided. The first undoubted discovery of Iceland was by some Irish monks about the year 795. they visited the island and dwelt on it from February till August. It was rediscovered by two Scandinavians, Narddodr and Gardar, some 60 or 70 years later, and the latter by circumnavigating it proved it to be an island. The permanent colonisation of the island was effected in the days ot Harold the Fairhaired, of Norway, a contemporary of our own king Alfred; and the first to settle in the country were two foster brothers, Ingólfr and Hjörleifr, the former of whom established himself at Reykjavík and is always looked upon as the founder of the colony.

The new land now attracted a large number of colonists, not only from Norway but also from Britain, and in a short time it was found necessary to frame a code of laws and to establish a court before which cases might be tried. The General Assembly or "Althing" held its first meeting in the year 929 and the spot chosen for the meeting-place on the plain of Thingvellir is both from its historical associations and its natural surroundings one of the most romantic in Iceland.

The Icelanders soon made considerable progress both in arts and literature and during the dark ages of Europe

> "Iceland shone with glorious love renowned
> A northern light when all was gloom around."

Iceland remained free until 1261 when, in consequence of internal dissensions it was betrayed to Norway. In 1380 Denmark and Norway were united, and from 1490 until 1874 the Danes ruled the land with a rod of iron. In the latter year—the thousandth anniversary of the colonisation—King Christian visited the island and presented the Icelanders with a charter granting them freedom in trade and self government.

The capital of the island is Reykjavík, a small town of nearly 4000 inhabitants, lying in a secluded bay which forms an excellent

natural harbour. The chief industries of the town are those connected with fishing, the fisheries about Iceland and the Faroë islands being some of the best in the world. The houses in Reykjavík are built of every conceivable material and whilst some are really substantial buildings others are of a very shaky construction.

There are no roads through the country and the only means of getting about is on ponies. These ponies are very sure footed and will carry their riders up or even down rocky paths almost as steep as an ordinary staircase.

The island is entirely volcanic and the eruptions here have been on a scale altogether unknown in any other part of Europe. There has never since the beginning of the 12th century been a period of 40 years, and very seldom one of 20 years, without either an eruption or a great earthquake. Some eruptions of Hekla have lasted for six years without ceasing.

The most remarkable of the natural phenomena presented by Iceland are the geysirs. These are hot springs which from time to time shoot up huge fountains or jets of boiling water. The two most famous are "Great Geysir" and Strokkr," the latter of which can be made to spout at any time by throwing down into it a quantity of huge sods. After an hour or so these are shot up again with a column of boiling water some 50 or 60 feet into the air and for more than another hour the spring shows unwonted signs of activity.

The true explanation of the action was first given by Bunsen and a fairly successful imitation of a geysir may be obtained —as was shewn during the lecture—by merely heating a pipe some four or five feet in length and filled with water.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Penny.

Saturday, July 5th.

H. B. Hopgood read a paper on "Photography."

The lecturer began by tracing the history of the art, laying special stress on its later development. He then proceeded to give an explanation of the action of light in photography, shewing how white light had a marked effect on the sensitive plates, while yellow rays had practically none; hence light could be admitted into a photographer's dark box through a yellow curtain without spoiling the plates. The difference between the two lights was illustrated by means of a spectrum thrown on the

screen. The camera and lenses were next discussed the lecturer's own apparatus being exhibited in illustration.

The lecturer then proceeded to explain the four great processes in Photography.

1.—The Daguerrotype. So called after M. Daguerre the inventor. Beautiful pictures were produced by this process, but the exposure was inordinately long, and reproduction was impossible. Accordingly the process was given up after Daguerre's death.

2.—The Positive Collodion. In this process too reproduction is impossible. It is only practised now by those itinerant photographers, who take their stand on every public resort and pest the public to have their portraits taken.

3.—The negative Collodion. This process was universal till quite lately, for with it portraits, which could be reproduced, were taken. But both these last methods were unsatisfactory. The plates had to be prepared on the spot just before the photograph was taken. Without a proper workman it was difficult to prepare the plates really well.

4.—The Dry Plate. The merit of this is that the plates are always ready for use and can be kept any length of time. Amateurs have been specially benefitted by this great invention which places photography within the reach of all.

The lecturer then gave an account of his own photographic experiences in the neighbourhood, and a most interesting lecture was closed by a series of slides illustrating a Photographer's perplexities when called upon to Photograph a refractory child.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Caulfeild.

Saturday, July 12th.

A Conversazione was held at the President's house.

Saturday, July 26th.

J. S. Marriner read his successful Essay for the Pender Prize, the subject of which was "British Beetles."

The lecturer began with a short account of British Beetles in general. He said that from their great varieties in size, shape and colour they were the most remarkable and wonderful

of any order of nature. He described shortly the structure of their bodies, saying that they were divided into three principal parts namely the Head, the Thorax and the Abdomen, also the way and manner in which they breathe, namely through what are called "Tracheæ," which are membranous tubes passing through the whole body very much as our nerves do; these tubes are kept open by a thin spiral thread passing all through the tubes, in the same way as a flexible gas tube is kept open by a spiral wire and are connected with the outer air by small holes in the body, a continual current of air passing through them. He then briefly noticed their classification into twelve classes, which again are subdivided into families and genera. Having shortly sketched "British Coleoptera" in general, the lecturer proceeded to describe them more in detail taking a single instance of each of the twelve divisions to represent each class. The first class was represented by the "Green Tiger Beetle" so often seen about our sandy paths and roads in June and July. Another example chosen was the "Oil Beetle," so called from its habit of, when touched, exuding from its joints an oil-like fluid. The female of this Beetle lays its eggs in tiny holes in the ground, many thousands in each hole; when the egg is hatched the Grub makes its way to an adjacent flower, here it patiently awaits the arrival of some innocent bee to collect the honey of the flower, it then attaches itself to the bee and is thus carried to the hive; here it takes up its abode and after undergoing a transformation is able to eat the honey which the bee has laid up for its own young, on this it thrives and soon reaches the perfect stage when it emerges from the bee's nest a full grown Beetle. The bee generally chosen is the Solitary Bee. Having thus described his subject more particularly he brought the lecture to a close by saying that Beetles generally were the scavengers of the world and that thus they performed and carried out their part in the design and work of Nature.

The lecture was illustrated by a few slides chiefly referring to the "Tracheæ" or breathing tubes.

At the conclusion Mr. Carr expressed the pleasure with which he had listened to the Essay and drew a lively picture of the lecturer's career in the "pursuit of science" which with him became the "science of pursuit."

Saturday, October 4th.

C. E. Williams, Esq. gave a lecture on "Early Astronomical Theories."

The lecturer began by pointing out the obvious facts of

Astronomy—the simplest of all being the alternate recurrence of day and night—which must have been noticed even from the earliest times. At this primitive stage we find universal the idea of a flat fixed earth and the hollow sky resting upon it. How the sun managed to reappear in the East after setting in the West was a great puzzle. Among other ideas on the subject was that of an ocean stream flowing round the Earth, and in which the sun was carried in a golden bowl, the land to the North being supposed to rise in hills lofty enough to conceal the sun on its journey.

The Vedic priests made the Sun go underneath, the earth, they said, being supported on twelve columns and the columns sustained by the sacrifices offered to the gods.

In this pre-scientific period we trace the formation of solar myth and also the rudiments of Astrology in the association of Star-groups with certain meteorological phenomena such as Sirius with the rising of the Nile and the Pleiades with the rainy season.

A considerable amount of evidence points to about 4000 years ago as the date and Chaldæa as the place when and where Astronomical observation began to be scientific. The lunar cycle of about 19 years, from which eclipses could be calculated, was the chief discovery before the phenomena were attacked by the Greek geometers.

The flat earth being abandoned gave place to one of a cylindrical form, then to a cube and lastly, to a sphere. Various fanciful theories were advanced to explain how it was supported until, finally, the idea was arrived at, that it remains in the centre of the universe because there is no reason why it should move one way rather than another. The School of Pythagoras taught that the earth moves and one Pythagorean, Aristarchus, propounded the true theory which we now know by the name of Copernicus. The commonly received idea among the Greeks was, however, that the earth was fixed in the centre of the universe and the heavenly bodies carried round it in transparent spheres. This theory, known to us as the system of Ptolemy, had in his time become very complicated with excentrics and epicycles added on to make it agree with more accurate observations. Diagrams of the Egyptian and Tychonic systems were also shewn on the screen.

The lecturer then alluded to the 'Music of the Spheres' giving the musical intervals between the different heavenly bodies and the reasons, according to the best authorities, why it is inaudible

> "There's not a single orb which thou beholdest
> But in his motion like an angel sings,
> Still quiring to the young-eyed cherubim,
> Such harmony is in immortal souls,

But whilst this muddy vesture of decay
Doth grossly close it in, we cannot hear it"

In the middle ages there was no advance in Scientific Astronomy but rather a backward tendency. Astrology however assumed great importance. In ancient times the Chaldæans had been celebrated as astrologers not only in their own country but in Greece and still more in the Roman Empire—in the 14th 15th and 16th centuries we again find it rampant in Europe.

The lecturer gave a brief outline of Astrology and, in connection with the influences of the planets, ruling in turn over successive hours of the day, shewed how each day of the week was named from the planet that presides over the first hour of that day.

As examples of the credulity of those times and ignorance of celestial phenomena, the wonderful meteor of A.D. 1000 and the comet of A.D. 1528 were shewn and the descriptions of them that have been handed down. Comets and Meteors were always supposed to accompany the death, or birth, of some great man or to denote some war pestilence or famine. The comet of 1680 was the first that was observed scientifically.

Turning to the revival of Astronomy we find that Copernicus, while proposing the true system of the universe, was aware that it had been known among the Greeks, and though he supported it with powerful arguments he had not the data wherewith to prove it. Tycho Brahé would not accept it but suggested a compromise, the Tychonic system, in which the planets go round the sun and the sun, with the planets, goes round the earth. Kepler, starting with a belief in the Tychonic system convinced himself, by careful calculation of the planetary movements, that the Copernican system is the right one. He shewed moreover that the orbits are not excentric circles but ellipses and formulated his celebrated Laws which paved the way for Newton's Law of Gravitation.

After a brief tribute to the labours of Galileo, the lecturer concluded by pointing out that the accepted theory of the Solar System not only remains unshaken but accumulates fresh evidence every year and has afforded the most convincing proof of its truth by leading to a discovery—that of the planet Neptune.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Upcott.

Saturday, October 18th.

The Secretary read a paper on "The Microscope."

As this evening was almost entirely devoted to an exhibition

of Microscope slides by means of the Society's Oxy-Hydrogen Microscope a detailed abstract is unnecessary.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, November 22nd.

H. F. Newall, Esq. gave a lecture on "Soap Bubbles."

It was shewn by two or three experiments that there exists in a film a certain pulling force or tension.

1. A soap film was spread on a rectangular frame, which was made of wire, three of the sides being fastened together, whilst the fourth side was free to slip up and down, so as to increase or diminish the area of the rectangle. The tension in the film-surfaces is enough to drag the moveable wire along on its rails, until it is quite in contact with the opposite side of the rectangle. The frame is tilted slightly so that the movement is not too sudden.

2. A wire frame of any shape was taken, and a fine thread was attached by its two ends to any points on the wire, so as to hang loosely across the frame. This is dipped into the soap mixture, and carefully raised sideways out of it, so as not to break the film that is formed on the frame. The thread is made to float in the film Then by means of a piece of blotting paper, the film is broken on one side of the thread. The tension in the remaining film is no longer balanced as before; the film contracts and pulls the thread with it, until the thread is quite taut. The curve of the thread is very regular: it is indeed part of a circle.

This experiment may be varied infinitely by taking threads of different lengths or attached at different points: or by substituting a loop instead of the plain thread: and breaking the film in the loose loop. The complete circle in this case is very beautiful.

The fact, that the curves assumed by the thread are circles or parts of a circle, proves that the tension is the same in all directions in the film.

It is to this tension that the form of a complete bubble is to be mainly attributed. The film tends to contract into the smallest space possible: this tendency is only resisted by the pressure of the air enclosed. The air is therefore pressed into a space bounded by a surface which is as small as possible, that is a spherical surface. The enclosed air is exposed to the pressure

of the air outside as well as to the pressure which arises from the tendency of the film to contract; it is therefore under greater pressure than the external air. This may be proved by observing the stream of air which comes from the mouth of a pipe-stem, when a bubble has just been blown on the bowl.

To illustrate the extreme elasticity and flexibility of the bubbles two circular wire rings were taken. On one of them a bubble was placed; and the second ring was lowered, so as to let the bubble attach itself: and then raised. The bubble was thus drawn out of its spherical shape, until it gradually became cylindrical and finally as its 'waist' so to speak became smaller and smaller it divided into two bubbles, one on each ring.

The lecturer then went on to deal with the cause of the exquisite colours of bubbles: and shewed various cases in which colours are produced in films, when they are very thin: as for instance when oil, or juice from orange peel, or turpentine is dropped on the surface of water, and the reflection of some source of light is observed. Again in the case of "Newton's Rings," which are produced in the very thin film of air, enclosed between two pieces of glass, when closely pressed together. The same cause is at work in the production of colours in the thin transparent wings of some flies.

The common cause is the suppression of one component or more from common light incident on the thin film: the suppression being the result of the interference of the two portions of light reflected from the upper and lower surfaces of the film.

At the conclusion a vote of thanks to the lecturer was proposed by The Master.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Saturday, February 2nd.

At a P.B.M., R. O. Crewe-Read, A. C. Campbell, C. G. Campbell, H. F. Magrath, T. C. Wolley-Dod, A. Lyon, J. H. Simpson J. R. Abbot, F. L. Jörgensen, A. J. Macandrew, G. Laing, J. C. M. Taylor, C. Devonshire, were elected Associates.

T. E. Crawhall and J. W. Cave were elected to serve on the Committee for the term.

At a Committee meeting J. L. Peareth, C. J. E. Parker and J. W. Cave were elected Members.

Wednesday, February 27th.

At a P.B.M., H. Feilding, W. F. Smith, C. G. Burnaby, R. Clayton-Browne, and Prince Adolphus of Teck, were elected Associates.

A. S. Orlebar, Esq. and C. E. Williams, Esq. were elected Honorary Members.

At a Committee Meeting, J. S. Marriner was elected a Member, under Rule 31.

Wednesday, May 7th.

At a P.B.M., R. P. Alleyne, G. J. FitzGerald, E. S. Blois, J. L. Hacket, A. L. Hine-Haycock J. R. Barkworth, Ll. Campbell, G. B. Drew, C. W. Lane, B. W. Constable, H. Russell, E. Rickards, P. E. L. Cust, A. B. Ward, were elected Associates.

C. J. E. Parker and J. L. Peareth were elected to serve on the Committee for the term.

G. F. Gorringe was elected Zoological Album Keeper.

At a Committee Meeting, J. M. Burn, G. F. Gorringe, and W. H. Gorringe were elected Members.

N. C. Macleod and C. J. E. Parker were chosen Judges for the Pender Prize.

Saturday, June 7th.

At a P.B.M., H. Macandrew, F. R. Elliot, and F. A. White were elected Associates.

Saturday, July 5th.

At a P.B.M., L. N. Szczepanski, C. C. Szczepanski, and F. H. Stanley were elected Associates, under Rule 31.

Saturday, July 26th.

At a P.B.M., Mrs. Pender and R. R. Ottley, Esq. were elected Corresponding Members, without subscriptions.

H. B. Hopgood resigned the office of Secretary.

A vote of thanks to him was passed.

N. C. Macleod resigned the Office of Treasurer.

A vote of thanks to him was passed.

J. C Inglis was elected Secretary and E. W. Stafford Treasurer.

F. G. Mackenzie resigned the office of Ethnological Album Keeper, A. Spencer-Wells of Botanical Album Keeper, G. F. Gorringe of Zoological Album Keeper, J. C. Inglis of Entomological Album Keeper, A. D. W. Pollock of Meteorological Album Keeper, and G. Walter of Geological Album Keeper.

Votes of thanks were passed to them.

G. F. Gorringe was re-elected Zoological Album Keeper.

G. Walter was re-elected Geological Album Keeper.

R. S. Heywood was elected Meteorological Album Keeper.

J. S. Marriner was elected Entomological Album Keeper.

A. U. Stockley was elected an Associate to take precedence of those elected at the previous meeting.

Monday, September 29th.

At a P.B.M., H. W. Patterson, H. F. Hall, D. P. Haig, G. V. Davidson, F. H. Smith, G. A. Becher, H. M. Braybrooke, W. S. Talbot, A. N. Denny, A. L. V. Wood, C. P. Simpson, C. G. Pack-Beresford, T. E. Case, H. V. Riddell, G. Walker, H. C. H. Burton, and E. de G. Davis, were elected Associates.

J. L. Peareth was elected Botanical Album Keeper.

J. W. Cave and H. H. Prince Christian Victor were elected to serve on the Committee for the term.

At a Committee meeting E. W. Stafford, R. S. Heywood, H. H. Prince Christian Victor, A. C. M. Croome, R. Munro-Ferguson, R. C. Wellesley, A. Parker, were elected Members.

EXCURSIONS.

On Thursday, March 20th, a party of the N.S.S., under the guidance of the President and Mr. Orlebar, made an excursion to Windsor and Eton. Leaving Great Gate at 12.45, we had a beautiful drive through Swinley and Windsor Parks; on the way the possibility of drinking shandy-gaff out a big tankard while the brake was in motion was well illustrated—often at the expense of the scientists clothes. To resume—we arrived at Windsor at 2.30, just too late to see the Royal Stables. Our first move was to the Albert Memorial Chapel, the beauties of which cannot be adequately described: the mosaics are particularly fine. Then we mounted the Round Tower, and got a good view of the surrounding country, while the Warder gave facetious members of the party opportunity for chaff. We next proceeded to St. George's Chapel. After this we went to Eton, and inspected the Library, Chapel, College dormitories, and sundry class rooms: of course we were specially reminded of the flogging block. Outside the College buildings we saw the Racquet Courts, Science Schools, and Museum, the two latter being shewn us by Dr. Carpenter, whom we know so well as a lecturer here. After being most hospitably entertained by Mr. Lowry and Mr. Impey, two of our old Masters who have migrated to Eton, we started on our homeward journey about 6.0. The way home was enlivened by songs and choruses, and a most enjoyable excursion closed with "God save the Queen" and "three cheers for the President."

On Monday, July 7th, the Officers and Committee of the Society, under the guidance of the President, made an expedition to Swindon to see the Engine Works of the G.W.R. We left the College Station by the 12.4 train, by kind permission of the Master, and after a journey of some two hours found ourselves at Swindon and forthwith proceeded to our destination. While awaiting a guide the first thing that attracted attention was some fractured axles shewing the flaws in the steel which are the cause of so many accidents. Thence we were taken to the wheel factory, where wheels were being forged, planed and finished: some of these were as much as 8 feet in diameter, being intended for driving wheels for the big express engines. We were next conducted into other shops in which every part of the engines is made. Unfortunately, it being Monday, the men were not engaged on the heavy pieces, and so we could not see the big steam hammers at work. A striking piece of apparatus was a machine, fed by a single man, capable of turning out very large numbers of rivets.

After a brief stay of but two hours we had to start back for home, and concluded a very pleasant excursion by a most hospitable entertainment at the President's House.

PRIZES.

A prize of the value of £5 is given annually by Mrs. Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition:

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two ordinary Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That preference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but

should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1884 was awarded to J. S. Marriner for an essay on "English Beetles."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The winner of the first prize for 1884 was L. N. Szczepanski the second prize was not awarded.

PHENOLOGICAL REPORT.

During the year the following observations were made of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list.

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &c.)

1	**Anemone nemorosa** (Wood Anemone)	Mar.	14
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)	Feb.	28
3	*Ranunculis acris* (Upright Crowfoot)	May	3
4	**Caltha palustris** (Marsh Marigold)	Mar.	17
5	*Papaver Rhœas* (Red Poppy)	May	22
6	*Nasturtium officinale* (Water Cress)		
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)	Mar.	17
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)		
9	*Draba Verna* (Whitlow Grass)	by Jan.	23
10	*Viola odorata* (Sweet Violet)	Mar.	2
11	*Polygala vulgaris* (Milkwort)	Ap.	5
12	*Lychnis Flos-cuculi* (Ragged Robin)	May	23
13	*Stellaria Holostea* (Greater Stitchwort)	by Jan.	23
14	**Malva sylvestris** (Common Mallow)		
15	*Hypericum tetrapterum* (Square St. John's Wort)		
16	,, *pulchrum* (Upright St. John's Wort)		
17	**Geranium Robertianum** (Herb Robert)	May	18
18	*Euonymus europœus* (Spindle-tree)		
19	*Acer Pseudo-platanus* (Sycamore)		
20	*Æsculus Hippocastanum* (Horse Chesnut)	May	8
21	*Cytisus Laburnum* (Laburnum)	May	10
22	**Trifolium repens** (Dutch Clover)	May	10
23	*Lotus corniculatus* (Bird's Foot Trefoil)	May	9
24	*Vicia Cracca* (Tufted Vetch)	May	15
25	,, *sepium* (Bush Vetch)	Ap.	2
26	*Lathyrus pratensis* (Meadow Vetchling)		
27	**Prunus spinosa** (Sloe, or Black-thorn)	Mar.	18
28	*Spirœa Ulmaria* (Meadow-Sweet)		
29	*Potentilla anserina* (Silver-weed)	May	22
30	*Rosa canina* (Dog Rose)	May	29
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)	May	4
32	*Cratœgus Oxyacantha* (Hawthorn)	May	8
33	*Epilobium hirsutum* (Great Hairy Willow-herb)		
34	,, *montanum* (Broad Willow-herb)		
35	*Angelica sylvestris* (Wild Angelica)		
36	*Daucus Carota* (Wild Carrot)		
37	**Hedera Helix** (Ivy)		
38	*Cornus sanguinea* (Dog-wood)		
39	*Syringa vulgaris* (Lilac)		
40	*Galium Aparine* (Cleavers)	May	16
41	,, *verum* (Yellow Bedstraw)		
42	*Dipsacus sylvestris* (Wild Teasel)		

43	*Scabiosa succisa* (Devil's-bit)	
44	*Petasites vulgaris* (Butter-bur)	
45	**Tussilago Farfara** (Coltsfoot)	Mar. 9
46	**Achillea Millefolium** (Milfoil, or Yarrow)	
47	*Chrysanthemum Leucanthemum* (Ox-eye)	May 14
48	*Artemisia vulgaris* (Mugwort)	
49	*Senecio Jacobæa* (Ragwort)	May 31
50	**Centaurea nigra** (Black Knap-weed)	
51	*Carduus lanceolatus* (Spear Thistle)	
52	,, *arvensis* (Field Thistle)	
53	*Sonchus arvensis* (Corn Sow Thistle)	May 27
54	*Hieracium Pilosella* (Mouse-ear or Hawk-weed)	May 25
55	**Campanula rotundifolia** (Hair-bell)	
56	*Ligustrum vulgare* (Privet)	May 22
57	**Convolvus sepium** (Greater Bind-weed)	
58	*Symphytum officinale* (Comfrey)	
59	*Pedicularis sylvatica* (Red Rattle)	May 8
60	*Veronica Chamædrys* (Germander Speedwell)	Mar. 9
61	*Mentha aquàtica* (Water Mint)	
62	*Thymus Serpyllum* (Wild Thyme)	
63	*Prunella vulgaris* (Self-heal)	
64	*Nepeta Glechoma* (Ground Ivy)	Mar. 16
65	*Galeopsis Tetrahit* (Hemp-nettle)	
66	*Stachys sylvatica* (Hedge Woundwort)	
67	*Ajuga reptans* (Bugle)	May 10
68	**Primula veris** (Cowslip)	Mar. 9
69	*Plantago lanceolata* (Ribwort Plantain)	
70	*Mercurialis perennis* (Dog's Mercury)	by Jan. 23
71	*Ulmus montana* (Wych Elm)	Mar. 17
72	*Salix Caprea* (Great Sallow)	by Jan. 23
73	*Fagus sylvatica* (Beech)	
74	*Corylus Avellana* (Hazel)	by Jan. 23
75	*Orchis maculata* (Spotted Orchis)	May 21
76	*Iris Pseud-acorus* (Yellow Iris)	
77	*Narcissus Pseudo-narcissus* (Daffodil)	Feb. 27
78	*Galanthus nivalis* (Snowdrop)	
79	**Scilla nutans** (Blue-bell)	Mar. 27

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY.)

80 *Melolontha vulgaris* (Cock Chafer, or May Bug)
81 *Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)
82 *Timarcha lævigata* (Bloody-nose Beetle)
83 *Lampyris noctiluca* (Glow-worm)
84 *Apis mellifica* (Honey Bee, or Common Hive Bee)
85 *Vespa vulgaris* (Wasp)
86 *Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)
87 ,, *Rapæ* (Small Garden White or Cabbage Butterfly)
88 *Anthocharis Cardamines* (Orange-tip Butterfly)
89 *Epinephile Janira* (Meadow-brown Butterfly)
90 *Bibio Marci* (St. Mark's Fly)

BIRDS.

(ARRIVAL ; SONG ; NESTING ; FIRST EGG.)

91 *Strix aluco* (Brown Owl)		
92 *Muscicapa grisola* (Flycatcher)		
93 *Turdus musicus* (Song Thrush)	egg..Mar.	6
94 „ *pilaris* (Fieldfare)	as late as May	25
95 *Daulias luscinia* (Nightingale)	sg. ..June	1
96 *Saxicola œnanthe* (Wheatear)		
97 *Phylloscopus trochilus* (Willow Wren)		
98 „ *collybita* (Chiff chaff)		
99 *Alauda arvensis* (Sky-lark)	sg. ..Feb.	6
100 *Fringilla cælebs* (Chaffinch)		
101 *Corvus frugilegus* (Rook)	egg..Mar.	27
102 *Cuculus canorus* (Cuckoo)	sg. ..Ap.	30
103 *Hirundo rustica* (Swallow, or Chimney Swallow)	seen..Ap.	16
104 „ *urbica* (House Martin)	seen..May	9
105 „ *riparia* (Sand-Martin)		
106 *Cypselus apus* (Swift)	seen..May	5
107 *Caprimulgus europæus* Goatsucker, or Fern-owl)	sg. ..May	9
108 *Columba turtur* (Turtle Dove)		
109 *Perdix cinerea* (Partridge)		
110 *Scolopax rusticola* (Woodcock) With young just hatched	Ap.	17
111 *Crex pratensis* (Corncrake, or Land Rail).		

MISCELLANEOUS.

(FIRST APPEARANCE.)

112 **Frog Spawn**	Mar.	16
Tadpole	May	24

METEOROLOGICAL REPORT.

No new instruments have been purchased during the year, but those in the Society's possession have been read daily at 9 A.M.

During the holidays the observations have been made by Sergeant Perkins.

The observations have been sent every month to the Royal Meteorological Society, and those of the rainfall have been sent also to Mr. Symons, F. R. S., for insertion in his Annual Table of British Rainfall.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/°	0—10	In.	
1	30·26	36·8	29·9	37·8	32·0	31·1	29·0	88	10	·01	N.E.
2	30·06	48·1	30·3	49·4	36·9	36·9	36·9	100	10	·10	N.E.
3	29·90	50·0	36·3	58·1	48·0	48·0	48·0	100	10	·13	S.E.
4	30·11	48·9	45·1	54·1	46·1	46·1	46·1	100	10	·01	S.E.
5	29·99	49·1	45·6	53·1	46·9	46·6	46·3	98	10	·21	S.E.
6	·80	52·1	43·5	81·2	48·9	47.5	46·0	90	4	·01	S.W.
7	29·96	45·5	43·2	67·6	43·9	39·6	34·5	71	9	·03	W.
8	30·16	48·2	36·4	49·0	39·9	38·0	35·5	85	10	·10	W.
9	·26	49·7	38·9	46·3	46·4	45·0	42·3	90	9		S.W.
10	·38	51·5	41·3	73·1	44·4	43·4	42·2	92	7		S.W.
11	·03	46·9	40·2	78·5	43·0	42·2	41·2	94	4	·03	S.W.
12	·36	43·0	32 3	77·1	34·5	33·3	31·3	88	2		S.W.
13	·45	45·0	34·3	63·2	41·9	39·9	37·4	84	9		N.W.
14	·42	49·2	38·3	75·6	42·0	40·3	38·3	87	9		N.W.
15	·56	49·8	41·3	61·5	47·4	46·4	45·3	93	10		N.W.
16	·61	41·5	47·6	41·2	39·9	39·9	39·9	100	10		N.
17	·59	42·5	38·3	45·4	39·9	39·0	37·8	93	10		N.W.
18	·55	46·5	39·2	64·1	40·9	40·0	38·8	93	10		N.W.
19	·58	46·5	40·1	50·6	42·7	41·0	39·0	87	10		N.W.
20	·45	49·8	35·3	54·1	42·8	40.9	38·6	85	10		S.W.
21	·46	51·6	41·4	84·3	45·4	44·7	43·9	95	3		S.W.
22	30·25	51·6	44·3	78·0	48·0	45·1	41·9	80	9	·04	S.W.
23	29·77	52·0	47·2	56·0	50·4	50·1	49·8	98	10	·21	S.W.
24	·82	43·1	36·6	76·4	37·9	34·4	29·6	72	6		N.W.
25	·68	47·4	35·5	67·3	41·9	39·8	37·2	84	3	·32	S.W.
26	·28	49·3	36·1		38·6	36·8	34·4	85	10	·58	S.W.
27	·07	39·6	33·3	76·1	34·4	32·8	30·1	83	5	·18	S.W.
28	·56	49·7	32·0	80·6	36·9	34·3	30·8	77	2	·18	W.
29	·76	54·0	35·6	73·4	49·3	49·3	49·3	100	10	·02	S.W.
30	·81	54·1	49·0	67·6	52·6	51·3	50·0	91	10	·21	S.W.
31	29·82	50·6	42·9	53·3	49·1	48·6	48·1	97	10	·19	S.
Mean	30·09	47·9	39·1	62·9	43·0	41·7	40·0	90	7·9	Total 2·56	

FEBRUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew. Point	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	29·44	48·6	43·5		44·2	42·1	39·5	84	5	·31	S.W.
2	29·75	41·0	37·2	61·3	37·9	36·8	35·3	90	10	trace	N.E.
3	30·42	43·7	26·4	51·8	30·7	29·7	26·4	84	9	trace	S.W.
4	·40	50·1	30·3	74·3	43·4	42·9	42·3	96	7	trace	S.W.
5	·40	47·1	30·1	58·6	13·9	42·9	41·7	92	10	trace	S.
6	·25	45·3	39·7	55·6	41·1	38·9	36·0	83	10		S.
7	30·09	43·5	34·0	73·8	36·9	36·6	36·1	97	10		N.E.
8	29·93	46·6	32·9	53·4	37 6	37·2	36·6	96	10	·05	N.W.
9	·58	50·2	37·1	58·3	46·4	45·9	45·4	96	10	·27	S.E.
10	·49	44·3	40·2	80·8	42·7	40·0	36·5	79	4	·17	S.W.
11	·68	45·8	35·5	74·1	38·8	37·2	35·0	90	4	·24	S.W.
12	·90	47·9	37·1	75·4	44·8	42·5	39·7	84	5	·01	S.
13	29·90	55·4	42·9	95·9	46·9	45·4	43·7	89	7	·04	S.W.
14	30·14	51·3	42·5	92·5	44·9	44·1	43·1	94	8	trace	S.W.
15	·03	45·3	40·0	83·9	40·9	39·8	38·4	91	10		S.E.
16	30·04	40·2	30·4	74·1	34·7	32·7	28·5	80	5		S.E.
17	29·80	43·2	33·6	69.6	34·0	31·0	22·9	71	9		S.E.
18	·79	44·9	33·8	85·4	36·8	34·4	30·3	79	7	·12	S.E.
19	·71	47·1	35·4	53·8	44·1	44·1	44·1	100	10	·09	S.W.
20	·82	51·8	42·8	91·1	45·0	42·9	40·5	85	5	·09	S.E.
21	·70	51·8	42·4	92·2	43·3	42·0	40·4	90	10	·29	S.W.
22	·63	50·7	37·7	75·7	46·1	44·7	43·2	90	0	·24	S.W.
23	·53	51·1	35·9	90·9	41·1	40·9	40·6	98	4	·01	S.E.
24	·53	48·5	40·4	82·7	44·5	41·9	38·9	81	8	·02	S.W.
25	·86	46·6	31·8	82·8	40·9	38·9	36·4	84	6	·01	S.W.
26	·90	46·9	35·8	94·0	38·9	38·2	37·3	92	9		S.W.
27	·95	43·2	28·5	59·2	36·6	35·7	34·5	92	10		S.E.
28	.90	39·5	31·4	60·2	36·7	33·6	29·2	73	9		N.E.
29	29·87	41·1	28·5	74·0	34·4	32·0	28·0	77	3		N.E.
Mean	29·88	46·6	35·8	74·1	40·6	39·1	36·9	87	7·6	Total 1·96	

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/°	0—10	In.	
1	29·95	40·3	25·8	81·1	33·4	31·4	27·6	78	2		N.E.
2	·92	42·7	26·2	84·0	33·9	33·3	32·2	93	3	·01	N.E.
3	·87	44·8	26·6	46·7	35·8	34·9	33·5	92	10	·47	S.E.
4	29·60	50·3	35·2	75·4	45·0	44·8	44·6	99	10	·25	S.E.
5	30·05	49·5	35·8	90·7	42·4	39·4	35·7	77	1	trace	S.W.
6	30·20	52·9	30·5	100·5	37·7	36·7	35·3	91	8	trace	S.W.
7	29·93	47·5	31·4	68·7	41·1	40·9	40·6	98	6		S.W.
8	·77	48·4	33·1	77·6	39·5	38·7	37·7	93	9	.13	S.
9	·61	50·6	36·0	100·0	40·0	38·8	37·0	90	4	·18	S.W.
10	·19	48·9	38·5	90·0	40·4	39·2	37·6	90	10	·41	S.
11	·21	44·7	36·6	77·9	39·0	38·7	38·3	97	10	trace	N.E.
12	29·66	51·8	34·9	83·9	41·9	40·9	39·7	92	10		S.W.
13	30·03	54·6	41·5	91·3	48·8	46·6	44·2	85	10		S.
14	·10	59·5	44·7	98·0	49·4	46·3	43·0	79	10		S.
15	·06	64·6	44·2	106·8	54·5	51·0	47·6	77	2		S.
16	·02	67·2	45·1	107·5	53·9	49·5	45·2	72	0		S.
17	·02	65·4	40·1	107·8	55·0	52·3	49·7	82	3		S.
18	·03	61·0	45·1	92·9	53·1	51·2	49·3	87	9		S.
19	30·10	56·4	41·2	103·3	44·7	43·0	41·0	87	10	·03	S.
20	29·94	50·4	38.4	101·8	45·0	41·5	37·5	76	4	·03	S.W.
21	29·95	51·1	36·4	95·4	41·3	38·5	35·0	78	9		S.W.
22	30·04	51·5	37·5	93·7	42·9	40·7	38·1	83	0		W.
23	·07	51·0	37·8	98·3	43·0	39·9	36·2	77	3		N.
24	·11	51·2	31·3	95·5	41·2	39·3	36·9	85	2		N.W.
25	·13	44·4	28·0	80·4	35·6	34·6	33·0	91	9		N.E.
26	·04	44·2	35·6	68·9	38·9	35·5	31·0	72	10		N.E.
27	·10	46·5	36·6	50·2	38·2	34·6	29·7	71	10		N.E.
28	30·05	41·3	34·8	54·6	38·9	37·3	35·3	87	10		N.E.
29	29·99	46·1	36·8	86·2	40·3	37·7	34·4	79	10		N.E.
30	·80	50·2	28·5	88·5	38·8	38·3	37·6	96	10	·01	N.E.
31	29·50	51·7	38·5	81·8	45·7	44·3	42·3	92	10	·05	S.E.
Mean	29·90	51.0	35·9	86·4	42·6	40·6	38·2	85	6·7	Total 1·57	

APRIL.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	%	0—10	In.	
1	29·54	57·8	40·7	98·4	49·2	47·8	46·3	90	10	trace	S.
2	·60	62·1	45·7	114·7	57·1	52·0	47·3	70	5	·02	S.
3	·49	61·9	45·8	108·3	58·8	52·5	47·0	65	8	·29	S.
4	·54	61·9	40·6	108·3	48·9	46·5	43·9	83	5	·23	S.
5	·71	59·0	45·8	108·5	51·0	48·0	44·9	80	9	·09	S.
6	·58	54·2	44·5	81·9	48·9	47·3	45·5	89	9	·45	
7	·51	56·5	44·3	96·6	45·0	44·8	44·6	98	10	·03	N.
8	·89	54·6	40·3	93·9	43.7	43·7	43·7	100	10		N.
9	·93	59·7	43·5	101·0	47·9	47·0	46·0	94	10		N.W.
10	29·93	57·4	30·3	104·5	42·9	40·0	36·5	78	8		N.
11	30·02	51·5	29·6	102·7	43·0	39·4	35·1	73	7		N.E.
12	·01	50·1	35·3	105·2	45·3	43·2	40·8	85	8	·01	N.E.
13	·00	52·8	29·9	89.3	44·4	40·4	35·7	72	8	·01	N.E.
14	30·03	51·5	31·5	98·0	41·9	39·1	35·6	78	10	·04	N.E.
15	29·95	49·4	37·4	88·3	42·2	41·4	40·4	94	10		N.E.
16	·81	49·1	37·3	85·9	41·4	38·9	35·7	90	10		N.E.
17	·89	46·4	34·5	69·0	42·1	39·0	35·2	76	8		N.E.
18	·95	46·5	33·0	106.0	37·9	37·7	37·4	98	9		N.E.
19	·80	45·3	22·7	93·2	40·9	40·9	40·9	100	4		N.E.
20	·90	44·7	28·0	94·4	41·9	41·9	41·9	100	5		N.E.
21	·92	45·2	25·8	89·0	41·9	41·9	41·9	100	10		N.E.
22	·97	48·2	25·3	97·4	42·0	42·0	42·0	100	7		N.E.
23	·94	48·5	21·0	102·2	44·5	44·4	44·3	99	4		N.E.
24	·82	49·6	24·9	100·5	41·4	41·1	40·7	98	4		N.E.
25	·82	48·5	26·5	101·4	44·7	39·9	34·3	67	6		N.E.
26	·82	49·4	35·0	98·6	47.6	41·7	35·2	63	2	·10	N.E.
27	·65	50·1	31·0	96·1	42·9	41·6	40·0	90	10	·22	S.W.
28	·71	45·1	37·7	65·6	43·6	42·3	40·7	90	10	·06	S.W.
29	·75	47·2	31·1	88·5	46·4	44·0	41·3	83	8		N.W.
30	29·75	57·2	33·0	108·3	40·1	40·0	39·9	99	4	·01	N.W.
Mean	29·20	52·0	34·4	96·5	44.6	43·0	40·8	86	7·4	Total 1·56	

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	29·90	52·7	32·6	93·1	49·2	44·1	38·6	67	3	·01	S.W.
2	·76	55·2	44·2	100·2	50·9	46·2	41·3	70	8	·05	S.W.
3	·45	} 56·2	49·1	} 95·8	49·9	48·9	47·8	93	10	} ·18	W.
4			} 38·6								
5	·47	55·9		105·7	50·9	46·1	41·1	69	5	·30	N.W.
6	29·73	} 55·2	35·5	} 90·0	49·1	43·0	36·4	62	3	·02	N.W.
7	30·05		} 45·1							·10	
8		57·7		87·3	53·9	50·1	46·4	75	8	trace	S.W.
9	·19	62·6	43·1	116·9					10		S.
10	·26	70·9	42·8	117·3	60·7	54·3	48·7	64	4		S.
11	·09	75·9	45·2	120·9	61·8	58·7	56·0	82	1		S.
12	·02	72·4	46·2	119·6	58·9	54·6	50·7	75	5		S.
13	30·01	68·2	47·6	114·8	56·7	52·0	47.7	72	5	·01	E.
14	29·85	60·6	44·9	113·4	51·8	50·0	48·2	88	10	·02	S.W.
15	30·12	58·1	45·1	89·7	50·1	47·2	44·1	81	10		S.W.
16	30·07	65·3	49·8	115·1	57·3	55·0	52·9	86	10		S.W.
17	29·89	70·0	49·2	116·3	56·8	53·4	50·2	79	4		S.W.
18	·85	61·3	46·9	114·3	52·9	46·5	40·1	62	6		N.W.
19	29·89	56·0	41·8	94·6	47 0	46·7	46.4	98	10		N.W.
20	30·06	62·5	38·3	114·4	52·2	48·6	44·9	76	8		W.
21	·43	65·9	34·9	116·4	57·7	49·9	42·9	58	2		S.W.
22	·44	70·6	35·8	114·9	62·8	53·9	46·3	55	2		E.
23	·26	76·0	46·2	119·2	66·1	57·0	49·6	56	2		S.E.
24	·06	80·5	43·6	121·2	65·6	58·7	53·1	65	0		S.E.
25	·11	59·3	47·4	99·1	51·8	48·9	45·9	81	10	trace	E.
26	·23	65·9	45·2	110·5	57·9	52·5	47·6	69	2		N.E.
27	·29	65·9	38·4	106·6	56·6	51·1	46·0	68	2		N.E.
28	·24	55·1	39·2	95·0	47·4	44·1	40·4	78	10		N.E.
29	·19	56·4	44·1	99·4	47·8	44·7	41·3	79	10		N.E.
30	·05	65·4	40·8	117·1	55·2	49.8	44·6	68	6		N.E.
31	30·06	57·5	39·2	102·9	52·6	47·1	41·6	67	5		N.E.
Mean	30·04	63·3	42·8	107·6	54·7	50·1	45·7	73	6·1	Total ·69	

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°	°/o	0—10	In.	
1	30·04	61·9	35·1	119·0	51·8	47·0	42·1	70	8		N.W.
2	29·69	66·5	43·3	117·7	58·2	52·0	45·8	65	5		S.W.
3	·59	62·7	43·2	86·5	57·9	53·0	48·6	72	8	·04	N.E.
4	·79	55·7	43·4	73·3	51·8	49·0	46·6	85	10	·15	N.E.
5	·82	56·2	48·1	90·7	52·0	50·3	48·0	84	10	.50	N.E.
6	·78	59·9	46·4	114·7	51·2	50·2	49·2	92	10	·47	S.W.
7	·54	57·2	43·8	111·4	46·9	46·1	45·2	94	10	·03	N.E.
8	·80	58·4	46·2	97·4	49·9	48·1	46·2	87	10	·21	N.E.
9	29·89	57·6	43·8	108·1	48·1	45·9	43·5	85	10	·03	N.W.
10	30·10	61·9	46·2	103·9	54·3	50·1	46·0	73	6		N.W.
11	·19	64·7	43·6	113·0	56.7	51·0	45·8	67	7		S.W.
12	·31	72·6	49·0	122·3	64·1	57·9	52·6	66	2		S.W.
13	·33	76·7	49·2	121·8	66·4	59·8	54·5	66	1		N.W.
14	·28	67·3	55·5	118·5	60·7				8		N.E.
15	·32	61·9	43·9	115·5	55·1				6		N.W.
16	·23	62·1	45·2	115·7	51·9				10		S.E.
17	·20	57·8	45·5	101·9	51·5				10		S.E.
18	·20	64.0	43·7	115·1	57·1				9		N.E.
19	·25	68·5	48·2	115·6	60·3	55·6	51·5	73	6		N.W.
20	·24	66·7	50·2	112·7	61·0	56·5	52·6	74	10		N.W.
21	·23	66·5	50·3	115·3	58 5	52·7	47·5	67	4		N.E.
22	·19	69·1	47·2	101·3	60·0	54·2	49·1	67	3		N.W.
23	·09	67·5	50·0	97·2	60·1	55·9	52·2	75	6		N.W.
24	·03	69.6	47·7	119·5	59·9	57·9	56·1	88	4		S.W.
25	·05	72·2	56·0	124·4	58.5	56·9	55·5	88	10		N.W.
26	·24	76·6	44·5	120·7	66·1	56·8	49·3	55	1		S.
27	·20	79·0	49·3	124·9	69·8	62·1	56·2	62	2		N.E.
28	·26	81·1	51·9	123·5	70·9	62·2	55·5	58	3	·53	S.E.
29	·04	70·2	54·5	115·6	56·9	56·5	56·1	97	10	·01	S.E.
30	30·15	72·1	48·9	123·1	61·2	57·0	53·3	76	6		N.W.
Mean	30·07	66·1	47·1	111·3	57·6	53·8	50·0	75	6·8	Total 1·97	

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	°/ₒ	0—10	In.	
1	30·25	70·6	55·2	123·1	60·9	57·5	54·5	80	10		S.E.
2	·22	75·9	47·1	121·8	65·5	58·9	53·5	66	1		N.W.
3	30·09	81·3	50·0	125·0	71·8	63·3	56·9	59	0		N.W.
4	29·96	82·6	53·9	133·5	74·8	63·2	54·9	50	3		N.E.
5	29·98	71·2	54·5	112·1	69·9	61·7	55·3	60	7	·22	S.
6	30·00	67·9	52·3	123·1	61·9	58·0	54·7	78	8	·64	S.
7	30·04	72·6	54·1	125·0	63·4	58·3	53·9	72	5	trace	S.W.
8	29·96	79·5	55·2	132·4	67·9	61·0	55·6	65	8	·12	S.W.
9	·88	72·5	56·3	110·3	63·4	62·2	61·1	93	10	·10	W.
10	·69	} 66·7	54·6	} 115·8	62.1	61·8	61·5	99	10	} ·74	S.W.
11			} 50·5								
12	·90	72·0		114·9	63·0	59·6	56·6	80	10	·19	S.W.
13	29·94	77·1	57·2	121·7	71·8	64·9	59·7	66	6	·01	S.E.
14	30·00	68·6	52·0	122·3	62·7	58·7	55·3	77	10	·05	S.E.
15	29·98	66·7	55·5	111·2	60·7	59·8	59·0	95	10	·17	S.W.
16	·74	67·6	58·0	121·1	60·6	58·7	57·1	89	10	trace	S.W.
17	29·80	67·7	53·5	121·5	62·5	57·6	53·4	73	8	·05	S,W.
18	30·07	66·0	50·2	106·7	60·9	54·9	49·7	66	2	trace	S.W.
19	·15	65·6	48·4	119·1	56·9	51·2	46·0	67	4		N.W.
20	30·13	68·9	48·0	125·3	59·9	56·1	52·8	77	6		N.W.
	29·99	67·7	55·1	100·0	62·2	58·8	55·9	80	10		S.E.
22	30·05	68·5	55·9	121·1	65·9	60·0	55·2	69	9		N.W.
23	·26 94	} 67·6	58·0	} 115·8	60·3	57·9	55·8	86	10	} ·15	S.W.
24	·06		} 48·2								
25	·11	63·7		109·6	57·4	53·9	50·7	79	8	·01	N.W.
26	·23	61·1	38·8	102·1	55·2	50·9	46·8	73	10	·28	S.W.
27	·29	} 68·2	51·2	} 121·4	59·0	57·2	55·6	88	10	} ·15	S.W.
28	·24		} 49·8								
29	·19	70·3		109·1	64·8	61·7	59·1	82	9	·05	S.W.
30	·05	72·5	59·0	127·5	63·2	61·0	59·1	84	10		
31	30·06	74·0	53·0	126·1	68·6	62·2	57·0	66	3		
Mean	30·04	70·5	52·7	118·5	63·5	59·0	55·2	76	7·5	Total 2·93	

AUGUST.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Amnt. of Cloud.	Rain	Wind.
	In.	°	°	°	°	°	°	°/°	0—10	In.	
1	30·12	79·7	53·0	124·1	71·2	66·1	62·2	74	2		N.W.
2	29·98	74·0	57·9	127·3	70·9	64·9	60·3	69	2		S.E.
3	30·07	68·7	50·9	117·7	62·1	56·5	51·8	69	8		S.W.
4	·25	70·6	44·2	128·5	61·2	55·2	50·0	66	2		N.
5	·27	74·1	42·3	126·1	65·1	58·3	52·8	65	2		S.W.
6	·15	77·2	43·3	121·8	68·1	60·8	55·1	63	0		S.E.
7	·09	82·9	49·1	125·8	70·5	64·4	59·7	69	0		N.E.
8	·11	85·8	54·2	127·2	76·0	67·1	60·8	60	0	·47	N.E.
9	·04	83·7	59·3	125·3	73·7	67·0	62·1	68	6	·09	S.W.
10	30·06	79·9	58·0	122·4	62·9	62·1	62·2	95	10		
11	29·98	86·6	55·2	128·0	70·9	67·6	65·1	82	1	·01	S.E.
12	29·98	75·7	61·1	122·4	73·2	63·9	57·0	56	4		N.W.
13	30·05	73·3	58·2	122·4	68·0	63·3	59·5	75	7	·02	S.W.
14	30·02	71·2	53·1	124·5	63·9	57·4	52·0	65	3		W.
15		72·8	52·1	125·4	63·2	55·0	48·0	58	4		S.E.
16		73·8	45·3	125·5	65·0	55·3	47·3	53	9		N.E.
17	29.96	80·7	46·3	125·8	65·9	55·4	46·9	50	1		S.W.
18	·97	75·8	48·1	124·6	66·9	61·4	57·0	71	1		S.W.
19	29·95	66.4	49·4	105·1					9	·09	S.W.
20	30·05	71·7		123·3	61·4	56·5	52·2	73	0		W.
21	·22	76·8		122·2	64·4	59·3	55·0	72	0		N.
22	·21	79·5		119·9	69·1	60·8	54·4	59	0		N.E.
23	·14	83·3	48·0	127·6	71·0	59·8	51·3	48	0		S.E.
24	·13	84·2	48·8	125·6	74·4	63·9	56·2	53	0	·16	S.E.
25	·04	62·7	58·4	99·0	62·0	60·1	58·5	89	10	·06	N.
26	30·17	58·4	41·3	103·2	55·9	50·2	44·9	67	3	·	N.
27	29·98	59·6	45·5	91·4	54·1	51·1	48·2	80	10	·25	N.W.
28	·70	67·0	52·0	112·5	57·9	54·7	51·8	80	5	·01	N.W.
29	·71	63·5	48·1	117·9	57·3	51·1	55·4	65	4	·06	S.W.
30	·91	66·1	51·4	98·2	55·9	55·6	55·3	98	10	·04	N.W.
31	29·81	65·8	55·5	87·5	63·2	61·4	59·8	89	10	·22	W.
										Total	
Mean	30·04	73·9	51·1	118·6	65·5	59·5	55·1	69·4	4·0	1·48	

D

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°	°/。	0—10	In.	
1	29·60	65·1	56·1	104·0	59·3	58·9	58·5	98	10	·04	S.W.
2	·75	64·9	49·4	121·3	59·9	55·4	51·5	74	4	·03	S.W.
3	·74	65·3	46·1	120·2	61·9	56·5	51·9	70	5	·92	S.W.
4	·46	61·4	51·0	102·7	53·0	52·2	51·4	94	10	·02	N.
5	·60	63·7	45·6	116·6	56·5	50·9	45·8	67	4		N.W.
6	·70	61·9	41·8	74·1	53·1	51·2	49·3	87	10	·13	S.W.
7	29·61	63·7	52·3	105·2	55·4	50·5	45·8	71	10		W.
8	30·14	64·3	50·1	84·7	56·6	55·0	53·4	89	10		W.
9	·12	66·7	56·5	109·3	64·3	60·9	58·1	81	10		W.
10	·24	69·0		114·0	62·7	60·2	58·1	85	10		S.E.
11	·31	69·2	47·1	112·3	56·9	56·6	56·3	98	10		E.
12	·33	70·6	49·4	113·2	62·7	59·0	55·8	79	3		N.E.
13	·25	73·1	50·2	113·2	64·8	60·7	57·3	77	1		N.E.
14	·11	69·6	53·9	103·5	59·9	58·7	57·6	93	10	·01	N.E.
15	·04	70·9	55·1	102·7	61·7	60·1	58·7	90	7	·24	E.
16	·13	73·1	59·5	115·3	66·1	62·4	59·5	80	3		S.E.
17	·28	80·6	55·3	119·2	70·6	66·5	63·4	78	0		E.
18	·40	76·4	55·0	116·5	68·9	63·6	59·5	72	0		E.
19	·30	67·5	52·3	100·9	56·8	56·6	56·4	99	10		E.
20	30·15	70·3	48·2	113·3	60·4	56·7	53·5	78	6	·02	N.E.
21	29·80	68·2	46·4	112·2	59·9	59·9	59·9	100	10	·06	S.E.
22	29·81	63·8	49·5	112·7	54·9	51·0	47·3	74	1	·04	W.
23	30·20	61·3	45·8	110·5	54·1	49·6	45·3	72	1		W.
24	·23	61·5	48·4	100·1	55·4	50·8	46·5	73	9	·02	S.
25	30·20	63·8	45·9	111·7	55·7	53·0	50·5	83	1		W.
26	29·79	65·7	49·9	105·0	59·7	55·0	50·9	73	8	·02	S.
27	29·96	61·2	44·7	85·2	55·8	53·0	50·4	82	10	·02	S.W.
28	30·10	65·9	52·4	113·5	61·0	58·1	55·6	77	7		S.W.
29	·10	65·3	51·1	85·0	60·7	58·5	56·6	87	10	·03	S.W.
30	30·19	61·0	36·3	102·3	47·9	46·5	45·0	90	1	·01	W.
Mean	30·01	66·8	49·8	106·7	59·2	56·3	87·0	77·7	6·3	Total 1·61	

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	%	0—10	In.	
1	30·05	59·5	46·9	106·1	54·9	53·3	51·7	89	10	·01	W.
2	·09	62·6	40·3	89·8	53·6	50·9	48·2	81	10		S.E.
3	·09	59·4	46·2	108·8	53·0	49·2	45·4	75	1		S.W.
4	·45	58·4	38·5	105·5	48·3	44·8	40·9	77	2		N.
5	·65	54·6	33·3	81·0	47·8	45·1	42·1	81	2		N.E.
6	·49	58·3	43·7	95·7	54·3	51·6	48·9	82	9		N.
7	30·20	59·4	49·0	92·8	54·2	52·0	49·3	85	10		N.
8	29·86	58·5	43·7	97·1	44·9	44·9	44·9	100	10	·08	N.
9	·48	54·7	34·9	98·4	47·1	45·2	43·1	87	8	·45	S.
10	·43	44·5	43·2	75·1	43·7	42·7	41·5	92	9	·03	W.
11	·66	48·6	36·0	96·4	39·7	35·7	30·4	69	1		N.W.
12	29·78	48·9	44·1	88·5	45·0	42·7	40·1	84	6	·02	N.
13	30·04	48·9	31·8	93·1	40·7	38·0	34·5	79	0	·02	W.
14	·09	57·5	35·6	87·2	47·3	46·9	46·5	97	10		W.
15	·28	56·4	40·2	80·4	49·3	47·1	44·7	85	9		W.
16	·35	64·5	49·3	109·8	55·6	54·0	52·5	89	9		N.W.
17	·38	57·7	51·0	81·0	56·1	54·1	52·2	87	10		W.
18	·38	58·6	47·1	94·3	53·2	51·6	50·0	89	3		W.
19	·34	60·5	40·7	104·2	51·6	50·8	50·0	94	6		S.W.
20	·34	53·6	39·6	92·3	46·4	44·6	42·6	87	8		W.
21	.34	50·7	44·6	74·1	47·0	44·4	41·7	82	0		S.W.
22	30·22	58·9	44·7	95·8	50·5	48·0	47·4	83	1		N.E.
23	29·86	54·7	37·7	91·1	48·7	47·5	46·2	92	8		E.
24	29·90	53·2	40·2	88·5	46·0	45·9	45·8	99	10		N E.
25	30·07	55·2	33·9	86·3	43·9	43·8	43·7	99	1	·02	N.E.
26	29·61	70·2	42·8	95·6	54·9	54·2	53·5	95	10	·08	S.W.
27	·86	59·8	39·7	89·7	45·4	40·4	34·6	67	0	·01	S.W.
28	29·59	60·7	43·7	92·6	59·8	55·6	51·9	75	4	·15	S.W.
29	30·02	52·9	29·6	97·8	40·2	39·0	37·5	90	0	·01	S.W.
30	·23	56·8	33·2	102·7	47·0	45·7	44·3	91	3		S.W.
31	30·29	57·8	46·6	95·7	52·9	50.7	48·5	85	10		S.
Mean	30·08	56·6	41·0	93·1	49·1	47·1	45·0	86	5·8	Total ·88	

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	%	0—10	In.	
1	30·15	55·6	43·2	68·1	51·1	50·8	50·5	98	10		S.E.
2	29·91	60·6	49·6	95·1	55·4	54·4	53·4	93	6	·34	S.E.
3	30·05	48·4	35·1	89·0	39·1	38·9	38·6	98	0	·01	N.W.
4	29·90	55·9	31·1	87·2	45·9	45·8	45·7	99	10	·02	S.W.
5	29·91	59·5	45·5	99·4	53·2	50·7	47·2	84	1	·60	S.W.
6	30·02	55·4	46·6	75·4	47·3	47·2	47·1	99	10	·10	N.W.
7	29·81	58·7	46·7	91·4	55·2	54·0	52·8	92	2	·04	S.E.
8	30·33	54·5	35·3	90·3	42·3	41·5	40·6	94	3	·01	S.E.
9	·28	55.6	42·2	85·3	51·0	47·1	42·9	74	9	·02	S.W.
10	·51	54·4	45·2	79·8	48·2	47·0	45·7	92	10		N.E.
11	·40	49·9	45·3	87·8	45·9	44·5	43·0	90	10		N.E.
12	·23	47·5	40·3	54·0	45·5	43·5	41·2	86	10		N.E.
13	·34	45·6	42·3	51·1	43·1	42·4	41·6	95	10		N.E.
14	·43	45·6	36·7	76·2	39·9	39·2	38·3	94	4		N.E.
15	·49	43·9	29·2	69·9	32·6	32·1	31·5	93	10		N.E.
16	·28	37·8	29·2	41·1	35·4	34·7	33·6	93	10		E.
17	·23	42·5	28·5	79·2	35·9	34·6	32·6	88	10	·01	N.E.
18	·29	42·7	31·2	60·3	38·6	37·8	36·8	93	10	·01	N.W.
19	·43	44·5	34·3	72·1	37·5	36·8	35·8	94	9	·01	N.W.
20	30·20	44·6	35·8	73·2	38·9	37·0	34·5	84	9	·07	W.
21	29·77	41·9	33·3	53·7	39·1	38·3	37·3	94	10	·02	N.
22	30·10	41·5	30·3	73·1	34·6	33·8	32·6	91	4		N.W.
23	·10	10·6	30·8	71·9	31·9	31·2	29·6	91	0		N.E.
24	·07	38·9	27·5	43·7	35·1	34·8	34·3	97	10		N.
25	·19	35·1	22·8	55·8	28·4	28·1	26·9	93	5	·04	S.E.
26	·23	43·1	27·5	71·7	31·9	31·6	30·9	95	5	·01	S.
27	30·17	46.8	27·5	73·4	42·9	40·9	38·5	85	10	·05	S.W.
28	29·80	43 7	38·0	51·8	40·0	38 0	35·6	84	8	·01	S.W.
29	29·73	43·7	28·4	68·6	32·9	32·2	31·9	96	10	·01	N.W.
30		40·0	26·4	41·9	27·4	26·7	23·6	85	10	·20	S.W.
Mean	30·15	47·2	35·5	71·1	40·9	40·0	38·8	91	7·5	Total 1·64	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Dew Point.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	%	0—10	In.	
1	29·79	41·3	26·6	40·3	40·0	39·8	39·5	98	10	·02	N.
2	·77	53·4	32·2	53·2	35·4	35·1	34·6	97	10	·25	S.
3	·54	53·7	35·0	81·1	53·0	52·0	51·0	93	10	·37	S.W.
4	·25	51·3	40·9	96·1	45·5	43·7	41·6	87	8	·02	W.
5	·75	52·6	36·3	81·8	39·0	37·9	36·5	91	5	·18	S.W.
6	·71	53·6	38·4	58·6	52·1	51·1	50·1	93	10	·13	S.
7	·92	54·1	45·3	77·0	47·2	45·9	44·5	91	2	·18	S.
8	·81	48·1	46·3	52·3	46·9	45·2	43·3	88	10	·07	S.W.
9	29·92	43·5	38·1	45·6	38·7	38·1	37·3	95	10	·11	S.W.
10	30·09	50·7	33·3	62·1	43·4	41·8	39·9	88	10	·07	S.W.
11	29·68	49·4	43·0	59·1	46·9	44·8	42·5	86	7	·35	S.W.
12	30·13	52·0	41·4	68·6	44·9	42·0	38·6	79	9		S.W.
13	·16	54·6	44·4	72·0	50·9	49·2	47·5	88	10		S.W.
14	30·03	51·6	48·6	72·1	49·5	48·0	46·4	90	6	·13	S.
15	29·77	51·4	38·5	54·0	45·9	43·9	41·6	86	10		S.W.
16	30·03	42·6	31·3	70·1	33·0	32·3	30·9	89	1	·16	S.E.
17	29·59	39·3	32·3	64·3	35·9	34·6	32·7	88	3	·01	W.
18	·91	49·1	29·4	56·3	37·9	35·4	32·0	79	10	·17	S.W.
19	·58	46·2	37·1	73·1	41·1	38·3	34·8	78	2	·22	W.
20	·90	40·4	37·2	49·8	39·2	37·8	36·0	89	10	·05	N.W.
21	29·98	37·6	33·6	68·1	35·1	32·2	27·4	74	0		N.
22	30·08	41·3	33·3	73·1	36·4	35·2	33·4	89	0		N.
23	·07	37·0	34·4	41·0	35·9	33.8	30·7	81	10		N.E.
24	30·06	36·5	30·5	45·5	34·9	32·8	29·5	80	10		N.E.
25	29·99	37·8		59·5	35·9	33·9	30·9	82	7	·02	N.E.
26	30·03	35·6	28·4	42·3	35·1	33·0	29·7	79	10		N.E.
27	·15	36·3	31·5	37·5	34·9	33·5	34·4	86	10		N.E.
28	30·01	36·4	35·6	40·5	35·0				10		E.
29	29·76	36·4		36·6	34·9	33·7	31·8	88	10		E.
30	29·87	34·0	31·2	38·8	32·7	31·3	28·5	82	10		E.
31	30·10	39·4	23·5	59·0	30·4				10		N.E.
Mean	29·88	44·7	35·7	59·0	40·2	39·2	37·2	86·7	7·7	Total 2·51	

R. S. HEYWOOD,

Meteorological Album Keeper.

ENTOMOLOGICAL REPORT.

If the advance made in this branch of Natural Science last year was small the same might be said of this year, though I am afraid in a greater degree; for last year three new specimens were added to our list, but this year, although several observations have been made by W. H. Gorringe, no new species has been added at all, though several of Gorringe's observations were earlier than any date before recorded. It is to be hoped that when we are in possession of our future Museum, and are better able to classify and arrange our collections, which now from want of room are very scattered and out of place, a new zest and ardour will be given to our studies and that more will be accomplished in this branch of Science than of late.

The following is the list of Gorringe's observations, of which the first five are earlier than any any date before recorded.

Vanessa Urticæ (Small Tortoise-shell)	March 15th.
Vanessa Polychloros (Large Tortoise-shell)	March 15th.
Vanessa Cardui (Painted Lady)	May 18th.
Argynnis Selene (Small Pearl-bordered Fritillary)	June 16th.
Euchelia Jacobeæ (Cinnabar)	May 18th.
Gonepteryx Rhamni (Brimstone)	March 14th.
Asthena Candidata (Small White Wave)	July 2nd.
Satyrus Megoera (Wall)	May 18th.
Rumia Cratoegata (Brimstone Moth)	May 23rd.
Bombyx Rubi (Fox)	May 26th.
Chortobius Pamphilius (Small Heath)	May 26th.
Fidonia Piniaria (Bordered White)	May 25th.
Polyommatus Phloeas (Small Copper)	June 1st.
Lycoena Alexis (Common Blue)	June 12th.

J. S. MARRINER,

Entomological Album Keeper.

ZOOLOGICAL REPORT.

No new species have been recorded.

Migrants seem to have appeared earlier this year than usual probably owing to the mild winter.

Siskins were noticed on several occasions of which February 26th was the earliest.

Woodcock remained this year and bred with us, two nests were found and an unusual number were shot in the neighbourhood.

The nesting season was also unusually favourable this year both for game and other birds.

Fieldfares remained with us the whole summer, no nests have been recorded but young ones were noticed towards the end of June.

Cuckoos were unusually abundant this year in May and several eggs were obtained.

G. F. GORRINGE,

Zoological Album Keeper.

GEORGE BISHOP, PRINTER, WELLINGTON COLLEGE.

SIXTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1885.

“Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης.”
Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1886.

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WELLINGTON COLLEGE.
GEORGE BISHOP.

1886.

Contents.

PREFACE.

The records of observations for the past year are not so full as those we have been able to give on some previous occasions. This is due not to any falling off in interest but to the fact that several of our observers have lost the whole or part of their notes. We cannot too strongly urge upon everyone the necessity of writing down everything at once in a book kept solely for the purpose, and of not trusting to loose slips of paper some of which are sure sooner or later to be lost.

Towards the end of the year a standard barometer of Fortin's pattern was purchased. This has now been set up and its readings which we hope to give next year will greatly increase the value of the Meteorological Report.

RULES.

1. That this Society be called the "Wellington College Natural Science Society.

2. That the Society consist of Honorary Members, Corresponding Members, Members, and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary, and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15, That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Associates elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers to be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

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*U. S. Geological Survey.

Linnean Society.

Royal Meteorological Society.

Geological Survey Office.

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	£	s.	d.
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Subscriptions:			
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,, ,, Members and Associates	4	11	6
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H. F. Newall, Esq., for use of Gas Jars...		7	6
Sale of Report	8	7	8
	£48	15	11

Expenditure.

	£	s.	d.
Negretti and Zambra for Standard Barometer	11	1	6
Harvey and Peak for refilling Gas Jars ...	1	0	0
Rain Gauge Measure		6	6
Thermometer Certificates...		2	6
Perkins for reading thermometers &c. during holidays	1	0	0
Hire of slides		14	10
Carriage of Parcels		7	10
Stamps		9	0
Bishop, for printing Report, &c.	10	12	7
Balance in hand	23	1	2
	£48	15	11

Examined and found correct, S. A. SAUNDER.
Dec. 12, 1885.

R. S. HEYWOOD, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 7th.

A. Sidgwick, Esq. gave a lecture on "The Development of Insects."

Mr. Sidgwick began his lecture by saying that he had taken "Development of Insects" as the title of his lecture, but that he meant to confine himself for the most part to Moths and Butterflies. In dealing with these he did not intend to divide them into classes with long names, but simply to make a few remarks upon striking facts with regard to insects, which it was in the power of all to observe, and which had impressed themselves specially upon him.

The first point of interest is protective mimicry, that is to say the resemblance of certain insects to the surrounding objects, which serves as a protection against their foes. For instance Butterflies, when flying through the air, show the upper wings, the brightness losing itself in the light as they pass through the air: when they are at rest however they sit with their wings tightly pressed together so that from immediately above they form an almost invisible object, while when looked at from the side, the under wings are of a dingy brown or grey, and so dappled as to resemble the play of light and shade over portions of a plant. The only British Butterfly which seems an exception to this is the Green Hairstreak (Thecla Rubi), and in this case the brilliant green of the underwing is as great a protection as could be found. This imitation of colour will be found particularly true of that large class of moths found on palings, barks of trees, and stones, the Geometers; the majority of them will be found to imitate lichen, palings, or the dropping of birds. The bigger moths, the Underwings, Tigers, Eyed or Privet Hawk, which seem an exception to this, only display the brilliant underwings in flight, and when at rest sit with the dingy upperwings wrapped closely to the body, so that they look like chips of wood or twigs. The one moth with bright upper wings, the Buff tip, folds its wings in a cylindrical form over its

body, and with the two ochrous patches at either end, and the silvery wings between, looks altogether like a twig of Silver Birch that has been cut off. These remarks with regard to imitative colouring are further borne out, by the vivid, hectic hues of the Autumn Moths, but in this case there is further protection of form, as their wings are crumpled like a faded leaf.

To what are all these adaptations of colour attributable? It is only in the last quarter of a century that any satisfactory answer has been found. Darwin was the first to point out, that in every genus, species differ and only some survive. The question which shall be the survivors is settled by nature. It will be the cleverest fox, the swiftest stag, the sandiest lion, the most invisible insect. Had there not been some dispensation of the kind there would have been too many insects, as one female may lay hundreds or even thousands of eggs. It is then to their colour insects have most to look for protection, and those have survived in each generation which have adapted themselves most successfully. The lecturer then proceeded to take cases in which bright colour was a protection. There is in South America a family of Butterflies conspicuous, white, slow-flying termed Heliconidæ; and whereas their means of escape are very inadequate, they are furnished with a protection the most powerful of all, and that is they are nasty to the taste. Young birds no doubt try and suffer for it, and we may suppose that as soon as ever they can distinguish a Heliconia they will leave him alone. There is another butterfly called the Leptalis, which in form and colour so closely and accurately imitates the Heliconia as to be undistinguishable therefrom. We may imagine a bird sitting on a bough waiting for breakfast. Down come some twenty or thirty Heliconias. Bird sits still. 'I've tried that lot once,' says the bird, 'I won't try it again.' Presently down comes a Leptalis (for they are much rarer than the Heliconia). Bird sits still. Only another one of the same sort, thinks he. And so the tender Leptalis escapes all from his borrowed plumage. There is a case of the same kind with an African butterfly, a Merope, the male of which was well known, but of which no female specimen had been taken, until at last it was discovered that the female Merope had so assimilated itself in colour and markings with a Danais that mankind had not distinguished them, though structurally the two insects are quite distinct. Mr. Sidgwick then went on to discuss the development of insects as a whole, calling attention to the fact that insects were differentiated from other living things by passing through several stages, in each of which the process of natural selection is at work. The special points he selected were the legs and wings.

At first sight caterpillars seemed to have a varying number

of legs; but this is not really the case. The only real articulated legs are the six in front which are found in all, whilst the others, which vary in number or are non-existent (as in the case of the Geometers), are not legs at all but adaptations of the fleshy part of the insect in the form of suckers. Having disposed of the difficulty of the legs, what can be said about the wings? They are evidently a later development; for some insects are apterous, or some individuals in each community of insects, (*e.g.* ants) or some sexes are so. As yet we can know nothing certainly but we can make a shrewd guess that they arose from the membranous tissues, which originally were used as spiracles, or for some other purpose. All insects were originally in the water and as the ponds dried up the fittest insects flapped these membranous branchiæ and thus got from the subsiding pond to a fuller one; and so on till in the course of time the finest insects had perfect wings.

In conclusion the lecturer exhibited a picture of the Original Insect, a revolting looking creature, with a head, a thorax, fourteen segments and six legs. He then shortly sketched the various lines of devolopment followed by other insects; and then produced another picture of the Conservative Insects (Campodea) which by gloriously abiding by its primitive habits, rejecting all unseemly innovations in the way of polished shards, or beautiful wings, had managed to keep itself through thousands of years, the same repulsive imperfect organism it was to begin with.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

After the lecture a skull of one of the aboriginal Murrumbidgee River Blacks was exhibited. The skull had been presented to the Society by G. D. Ringrose, Esq., (O.W.) a vote of thanks to whom was proposed by the President.

Saturday, February 25th.

H. G. Armstrong, Esq. gave a lecture on "The Human Eye."

The lecture was illustrated by various pictures and diagrams shown by the oxyhydrogen light, and also by a large model which took to pieces exhibiting the various internal structures of which the organ is composed.

After pointing out the extreme value of the sense of sight the lecturer first drew attention to the cavity, composed of firm bones called the orbit, which served to protect the eye from external injury, unless directed with undue violence. Within the orbit

the organ rests on a bed of fat, which by permitting it to yield to moderate pressure still further protects it from injury. To prevent the entrance of small objects, such as dust, flies etc. are placed the eyelids and eyelashes, and if such should gain an entrance the lachrymal glands pour forth tears to wash away the irritating substance.

The eye was shown to be a nearly spherical body about one inch in diameter, moved by muscles, and supplied with blood vessels and nerves, to be formed externally of a dense white membrane called the sclerotic which was opaque, and of the cornea which was transparent, admitting light to the interior, over the whole of the front part there being a thin delicate membrane called the conjunctiva. The rays of light passing through the cornea entered the anterior chamber, which contained the aqueous humor, and passing through the pupil, an aperture in the coloured muscular membrane called the iris, were deflected by the crystalline lens through the vitreous chamber on to the retina at the back of the eye, where the picture was formed, which was, as it were, telegraphed to the brain.

The uses of the various structures of the eye were discussed at length, and the lecture closed wlth a few remarks on colour blindness, and some other phenomena of vision.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday March 7th.

C. Gatty, Esq. gave a lecture on "Greek Antiquities in Athens."

The lecturer began by a brief survey of the art of the Greeks in general, pointing out the three periods into which it naturally falls, each illustrative of their national life in its various stages of development.

The art of the first period, the hunting and agricultural stage represents the successful struggle of man against the animal world: its ornamentation is confined to conventional pattern. These two characteristics the lecturer showed on an early Scottish stone and a British shield, thus proving that they are not confined to the early Greeks. During this period the Greeks were largely influenced by the art of the Eastern nations with whom they were brought into contact by their commerce and colonies. But there is this important difference between Greek and Oriental art: Greek art advanced; Oriental art owing to

the despotic government of the great empires of the East remained stationary. As an illustration of this fact three instances of Egyptian art separated by some hundreds of years were shown, together with three Greek coins. These latter also illustrated the decadence of national life which accompanied the artistic advance of the third period; for the latest coin bore the head of the cruel barbarian Mithridates.

The second period begins with the attack of the Eastern world on Greece, and its utter defeat. All the best art of Athens is commemorative of this victory. This brought the lecturer to his main point, the photographs of Athens. Here we saw before us in rapid succession the Acropolis, Propylaea, *Νίκη Ἄπτερος*, Parthenon, Erechtheum, or rather what the Turkish and Venetian cannon-balls have left us of them. The Parthenon was described at length as the best type of the period. Its site is the finest in Athens, though it must not be imagined that a good site is indispensable to Greek art, witness the temple of Paestum. It is built of the white marble of Pentelicus (not of brick like the baths of Caracalla) and in architectural proportion has no equal in the world. We were shewn its Metopy, the battle of the Centaurs and Lapithae, and its famous frieze the Pan Athenaic Procession, the latter a good example of that repose and dignity, that absence of hurry and distress, which characterize this period of Greek art. Other illustrations of the same period were given, including some coins, a bronze and some most interesting drawings from Herculaneum.

The third period shews, as has been already mentioned, an advance in technical skill, but, owing to the loss of national freedom, a decadence of taste. Its characteristics are a loss of refinement and repose, and a love of Sensationalism. The examples of this period shewn were the Laocoon, so distressing to the spectator and so unreal in its elaborately worked out proportion, and the Dying Goth commonly known by its misnomer of the Dying Gladiator. Attention was called to the chief fault of Greek as constrasted with Christian art, its lack of spirituality. It displays all the beauties of the human body, but the varied expression of the human face it cannot touch. Give Hermes a "discus" in exchange for his "Caduceus"; and what is he but a Discobolus? What a contrast to two Christian Saints, each with a distinct individuality of face. The disastrous effect of the Renaissance on Christian art, owing to the introduction of the worst type of sensationalism of the third period of Greek art, was strikingly illustrated by the contrast of a Renaissance and Byzantine St. John the Baptist.

Last of all came some photographs from the Street of Tombs which depicted in the most touching manner that family life of the Athenians which we find it so hard to realize.

The lecturer concluded with a piece of advice to the Society. He suggested that if it wished to study Greek Art it should, in preference to plaster casts, invest in photographs of the originals which could from time to time be exhibited with appropriate explanations.

A vote of thanks to the lecturer was proposed by Mr. Newall.

Saturday May 9th.

S. A. Saunder, Esq. gave a lecture on "The Moon."

One of the earliest attempts to explain the phases of the Moon was that of the Chaldæans who supposed that our Satellite was a revolving globe one half of which was made of fire, and that as it revolved it presented to us alternately its bright and its dark sides. The true explanation was given about 600 years before Christ by Thales, one of the seven wise men: he noticed that the bright part of the moon was always that which was turned towards the sun, and at once inferred that the moon was a dark globe shining by reflected sunlight. The way in which the changes were brought about was illustrated during the lecture by means of a diagram and it was pointed out that as a consequence of the way in which the moon revolved it followed that in our latitude the crescent of a new moon would take the form of a D that of a moon past the full taking the form of a C. In the southern hemisphere the reverse of this would occur.

The largest telescope that has been constructed can be made to magnify the moon about 6000 times, that is it makes objects appear as large as they would at a distance of 40 miles, but it must not be supposed that we see them as clearly as we should with the naked eye at that distance. This is due partly to the defects from which no telescope is free, and partly to the fact we are situated at the bottom of a great ocean of air, the upper parts of which are never steady. Taking everything into account it is doubtful whether the moon has ever been seen more clearly that it would be with the naked eye at a distance of from 100 to 200 miles. We must not therefore expect to see more than the general outlines and bolder features of the surface. All the important mountains can be clearly made out, but objects of the size of a man, or even of a house, are for the present at all events entirely beyond our view.

The dark markings on the moon, visible to the naked eye and forming the well known "Man in the Moon," were for many years a puzzle. Anaxagoras who lived some 500 years B.C.

taught that they were due to mountains and valleys and was very much ridiculed for holding the belief that the moon might be as large as the Peloponesus. Aristotle 150 years later suggested that the light and dark regions were the reflected images of the continents and oceans of the earth, though how anyone having the slightest acquaintance with the laws of optics could have held such a theory is a mystery. Later on the dark parts of the moon were supposed to be actual seas and such they are still called though we now know them to be seas without water, for it is beyond doubt that the moon has no water and next to no atmosphere. The real explanation of the dark patches is that where these occur the surface of the moon consists of some substance which reflects less light than the surface in other parts, just as the dark soil of our gardens or a piece of black serpentine rock would reflect less light than a white chalky piece of ground.

When the moon is nearly full many systems of bright streaks radiating from different points form a very prominent feature, but at other times they entirely disappear or can only be traced with difficulty. No really satisfactory explanation has ever been offered.

Plutarch nearly 1800 years ago recognised indications of mountains in the moon in the irregularities which appeared on the moon's inner edge when seen with the naked eye, but it was reserved for Galileo to demonstrate their existence. In May 1609 he turned his first telescope on the moon and at once saw that it was covered with irregularities, when he had completed his largest telescope he was able to recognise the true condition of its surface. There are on the moon several enormous chains of mountains, but by far the most prominent feature is presented by an almost endless succession of ring mountains, sometimes with one or more huge cones standing up in the middle of the ring and sometimes with the interior almost level. They are of all sizes from less than one mile up to 300 miles in diameter, sometimes isolated sometimes in groups, sometimes with smaller rings on the walls of a larger and sometimes with a large ring enclosing several smaller ones. In almost every case the floor of the internal plane is at a lower level than the surrounding country, sometimes as much as 10,000 or 12,000 feet belwow it, while the mountain ring may rise 20,000 or 25,000 feet above the internal depression. Many theories have been put forward to account for the formation of these rings but none have met with universal approval.

Of all the superstitions connected with the moon none is more widespread than that which attributes to it an influence upon the weather. That the moon may in some way affect the weather is not improbable, but the superstition which connects

a change in the moon with a change in the weather is both unreasonable and has been shewn by the discussion of long continued series of observations to have no foundation in fact.

Of the influences which the moon really does exert upon the earth the most important are those connected with the tides. These are caused by the attraction of the moon, and the friction between the earth and the great tidal wave is slowly but surely stopping the earth. The comparison of modern observations with the details given by the Greek and Roman historians of old eclipses shews us that the earth is now going 11½ seconds a year slower than it was 2,500 years ago. Professor G. H. Darwin has during the last ten or twelve years been making some very elaborate and difficult calculations as to the further consequences of this tidal friction. He finds that at some time not less than 54 millions of years ago the earth and the moon were almost in contact, and there are reasons for believing that they had then but just separated, the earth having been torn in two by the joint action of its own rapid rotation and of the tides generated in it by the sun. Looking forward into the future Professor Darwin shews that the time will come when the earth will always turn the same face to the moon as the moon now always turns the same face to the earth, and that the inhabitants of the earth, if they still exist, will then have a day of from 500 to 600 hours followed by a night of the same length. By the time this happens the sun must have become perceptibly colder than it now is, and whether the human race is capable of so adapting itself to its surroundings as to survive all these vicissitudes is a question on which we may well have our doubts.

A vote of thanks to the lecturer was proposed by Mr. Goodchild.

Saturday, May 23rd.

The Rev. A. Carr gave a lecture on "Palestine."

On Jan. 16th, 1885, our party three in number left Trieste by an Austrian-Lloyd's boat for Alexandria where our fourth companion met us. A storm which broke over the restless Adriatic twice drove us to run for shelter, once in the harbour of Lyssa, and once in that of Zante. Nevertheless we were able fully to enjoy the fine coast and island scenery with its varied associations historical and mythical.

Taking another steamer at Alexandria after vexatious delays, off Port Said to assist an Italian ironclad in distress, and off Joppa for the purpose of quarantine, we landed not without some difficulty on the shores of Palestine.

At Joppa the chief point of interest is the reputed house of Simon the tanner where St. Peter received the message from the Centurion Cornelius.

Passing through the orange and lemon groves in the outskirts of Joppa laden with ripe golden fruit we drove across the plain of Sharon to Ramleh where we slept. Here for the first time we met with lepers—a piteous spectacle. Then along a road winding through barren hills to Jerusalem. Jerusalem viewed from the surrounding mountains is still a 'fair city' with graceful domes and minarets and walls of creamy limestone.

Here what we enjoyed more than the doubtful sites of 'Sacred places' within the city were the undoubted scenes without the walls, the Mount of Olives with Bethany and Gethsemane on its slopes, and the green hill of Calvary identified almost beyond a question.

Leaving Jerusalem we began tent life, riding the clever little horses of the country and encamping each night on some convenient level spot—often a threshing floor. Our dragoman Daoud Jamel proved to be an excellent companion and a good guide. At Hebron we had a most picturesque camping ground, pitching our tents over against the city and the mosque which still covers the cave of Macpelah and the bones of the patriarchs.

Retracing our steps after a night close to the wonderful 'Pools of Solomon' we passed along the beautiful valley of Artas—possibly Emmaus—and entered Bethlehem about midday. From the ridge of Bethlehem there is a lovely view of the blue range of the Moab mountains—a sight which associates the two homes of Ruth. The often described 'Cave of the nativity' is in all probability a genuine site and is therefore full of the deepest interest retaining as it does much of its original character.

Bethlehem both from the natural beauty of its situation and the truthfulness of its associations is unsurpassed by any of the scenes in the Holy Land. Our next night's halt was under the towering convent of Mar Saba built on precipitous rocks over the gorge of the Kidron.

Thence we descended to the shores of the Dead Sea where three of the party bathed while one watched with amusement their gambols on the surface of the too buoyant water. We all enjoyed the rest at Jericho—an oasis in the barren Jordan valley—and a morning bathe in the warm stream of Elisha's fountain.

The next points of interest were Bethel and Ai where it was quite possible to trace the plan of Joshua's attack on the latter city.

Our route then took us northward over the immemorial caravan road past many a consecrated spot to Shechem, now Nablous, in the centre of Palestine. Here Jacob's well and the tomb of Joseph are identified beyond question. And Ebal and Gerizim still close in the beautiful city of Shechem.

As we travelled north the scenery becomes softer and the land more fruitful, and better watered. The plains too spread more widely. To the most famous of these—the plain of Jezreel or Esdraelon—we were brought by a day's journey from Shechem. From Jenîn it is possible to see in the clear Eastern air, twenty-eight miles distant, half hidden in a mountain hollow, the city of Nazareth.

The journey across that historic plain was crowded with associations clustering round the names and the sites of Carmel, the river Kishon, Jezreel itself and Shunem, Endor and Nain, not to speak of Tabor and little Hermon.

Nazareth is the most charming of the Holy Places with its green pastures, in which groups of children in many coloured dresses were playing as we passed—a suggestive sight, and women returning from the well, and surrounding heights guarding the sacred valley from intrusion, and flocks of sheep feeding on the steep mountain sides. Here we stayed two days. Then we travelled on the road often trodden by the Saviour under Mount Tabor from Nazareth to the Sea of Galilee.

This lake has all possibilities of loveliness but its deserted lifeless shores leave a melancholy impression. The sea side cities are in ruins. But the ruins still bear trace of ancient magnificence. The scenery in many ways attests the accuracy of the gospel narratives. The *κρημνός* or 'steep place' on the East, and the *ὄρος* or 'high land' on the West, and the grassy slopes and 'level places' on the mountains still bear witness to the truth of the Evangelists.

Time did not allow a detailed description of the rest of the expedition. The lecturer therefore very briefly touched on the journey along the upper Jordan valley, the site of Dan, and the picturesque ruins and fine position of Cæsarea Philippi, the modern Banias, then the ride under Hermon, and across the desert plain to Damascus and finally the rich valleys of the Lebanon, the marvellous ruins of stately Baalbeck, the descent to Beyrût and the interesting coasting voyage past Phœnicia and Carmel and Cæsarea Stratonis, the scene of St. Paul's imprisonment.

A vote of thanks to the lecturer was proposed by The Master.

Saturday, June 6th.

The Rev. P. H. Kempthorne gave a lecture on "Saturn."

He explained the cause of its apparent retrograde movement and touched upon the methods of ascertaining its velocity, period

of revolution, and distance. Its shape and density were next discussed. The appearance and changes of the belts in Jupiter were described as tending to throw light upon the same phenomena in Saturn. It was inferred that the visible surface is that of a deep gaseous envelope, and in support of this conclusion the "square shouldered" appearance of Saturn was mentioned, and the sudden reappearance of one of Jupiter's moons after occultation had commenced. It was shewn that the phenomena of Saturn and Jupiter rather resemble those of the Sun than those of the Earth, in the depth of violent disturbance of atmosphere, the more rapid rotation of equatorial regions, and the (probable) self luminosity of the surface. It was supposed that the eight satellites might possibly derive both light and heat from their primary. It was next shewn that there was a curious analogy between the system of Saturn and the Solar system, the number and comparative distances of the moons corresponding remarkably to those of the larger planets; in particular that Titan the largest answered in position to Jupiter, while the gap between Titan and Rhea was analogous to that between Jupiter and Mars. The Rings were next described. It was mentioned that the crape ring is of recent formation, and that the rings are increasing in breadth at the rate of 20 or 30 miles every year. Clerk Maxwell's view that the rings are composed of a multitude of minute bodies was explained, and it was shewn that this theory offered the best explanation of their phenomena. It was stated that the small bodies, which have lately formed the crape ring probably belonged to the inner bright ring, whence collisions or disturbing attractions have expelled them. The Zodiacal Light possibly presented a phenomenon of the Solar System corresponding to the Rings.

The recent theory was then brought forward, that as the gaps in the orbits of the Asteroids are probably caused by the disturbing influence of Jupiter on those, whose periods once were measures of his own, so the gaps in the rings may have been caused by the influence of Saturn's moons on those minute bodies of the rings whose periods happened to correspond with theirs. The lecture was concluded by a reference to the formation of the Solar System on the theory of Laplace, and the illustration of it afforded by the rings of Saturn.

That planet had probably not yet cooled sufficiently to be the abode of life; like Jupiter, Uranus, and Neptune it was still in the period of youth; but it seemed hardly likely that it ever could be in the future adapted to be the abode of beings precisely resembling the human race.

A vote of thanks to the lecturer was proposed by Mr. Penny.

Saturday, June 27th.

Dr. J. S. Comyn gave a lecture on "Ithaca and the Greek Coasts, their Antiquities and Shooting."

After mentioning the pleasure he felt on making acquaintance with the School, through the circumstance of his taking medical charge during last summer vacation, he spoke of the interest taken by the Masters he then met in all matters relating to Greece.

By the kind invitation of the President, conveyed through the Rev. Arthur Carr he was here to treat of the island of Ulysses, which he had resided in as an Army Surgeon during part of the British occupation, and which he had constantly explored, Odyssey in hand. Also to give an account of the far famed shooting of Albania and the Greek coast; pointing out how the two occupations, archæology and shooting might be worked together.

After a few words on the political condition of the Ionian Islands from the times of the Venetian Republic to their union with Greece effected through the influence of Mr. Gladstone, he turned to the subject of Ithaca, and described (with the aid of the magic lantern) all the spots of supreme interest connected with the catastrophe of Homer's second great poem. The spot where Ulysses landed, the scene of the interveiw with his swineherd Eumaeus and his son Telemachus—his castle of Aëtos, with the doorway, still visible where he slew the hundred suitors.

The lecturer then dealt at some length with the subject of Cyclopean and Prehistoric architecture, showing views of Stonehenge, Mycenae and Troy, and eulogizing the labours of Dr. Schliemann.

Thence he proceeded to the Stone cutting of Ulysses' time exemplified in the Tomb of Penelope, a venerable relic of the past known to few even of the natives, so deeply is it hidden amongst the rocks and bushes of Mount Neritos. He shewed the lid with its female figure in high relief and the dog (Argus) lying at its feet, and drew attention to the water-worn sculpture representing chariots and horses, objects unknown in Ithaca to this day, from the rugged steep character of the island. He inferred that this design was employed to indicate the greatness of the family of Icarius her father just as heraldic blazonry is used to-day, and showed from the name of her most confidential attendant Hippodamia that Penelope came of a great horse-loving family on the mainland. All this he adduced to prove that such people as Ulysses and Penelope did actually live.

After showing Corfu and the islet known as "the ship turned into marble," "*Τὸ μαρμαρωμένον καράβι,*" the learned lecturer

proceeded to deal with the woodcock shooting of Albania, displaying on rough maps the woods and marshes he had so often shot over: giving minute directions to youthful sportsmen as to yachts, dogs, dress &c. taking them to the best points, and rivetting their attention on the mouths of the Acheron and Achelöus, and especially on the plains of the Louro between Parga Arta and the ruins of Nicopolis.

He next spoke of the language of modern Greece, advocating pronunciation by accent rather than by the length and shortness of vowels and diphthongs, and ended with a wish that all boys might learn at least the elements of Greek, with the object of taking up the classics during the leisure of later life, so that they might share in the glorious inheritance left by our intellectual ancestors in Literature, Science and Art.

The Rev. Arthur Carr proposed a vote of thanks in a humorous speech, alluding to the strange combination of ideas suggested by the lecture. He could fancy the hearers dreaming of taking out the dog Argus in company with the divine swineherd, to scour the Greek plains and forests in search of game. While he could not admit the correctness of a rule of pronunciation which would upset the canons of poetic metre, he would yet be glad to hear the learned gentleman defend a thesis on so interesting a subject.

Saturday, July 11th.

H. M. Elder, Esq. gave a lecture on "Photography."

Photography is at the same time a science and an art. The production of a picture depends on a number of different things. First there is the formation of an image of the picture on the sensitive plate. This is done by means of the lens in front of the photographer's camera. Rays of light pass from the object to the lens and are bent by it so that they cross and come to a focus on a screen, there forming an inverted image of the object to be photographed. (The formation of an image by a lens was exhibited at this point).

Then comes in the chemical action of the rays of light on the photographic plate. The plate is covered or smeared evenly with a composition containing silver which is affected by light. The bright parts of the image then act on this composition in such a way that when certain chemicals are applied the silver is reduced to the metallic state thus leaving an opaque reversed image on the plate. (The reducing action of pyro-gallic acid was shewn). This reversed image is called a negative and the process of obtaining it from the invisible image left by the light

is called development. To convert the negative, in which the shadows are light and the bright lights dark, into a positive picture it is printed on paper made sensitive in the same kind of way as the original plate. To do this the paper is laid against the negative as a printing frame and exposed to light when the image again inverted is formed on the paper again. (Examples of positives and negatives were exhibited on the screen.). The applications of photography are very numerous; among others photographic magic lantern slides may be made on glass and pictures may be printed on all kinds of fabric.

The lecturer then shewed a lantern slide of the front of the college prepared expressly for this lecture and concluded by taking a photograph of the audience and developing it before them. The finished negative was then thrown on the screen and created considerable amusement.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, July 25th.

J. S. Marriner read the successful Pender Prize Essay on "British flies."

The lecturer began with a few remarks on the classification and structure of Flies. The Flies noticed in the lecture belong to three great divisions of the Insect world, namely, the Neuroptera, Hymenoptera, and Diptera.

The breathing of Flies is carried on by means of what are called Tracheae or breathing tubes. These Tracheae are membranous tubes distributed over the whole body, very much as our nerves are. They are kept open by a spiral thread passing through the whole length of the tube, in the same way as a flexible gas tube is kept open by a spiral wire.

After having briefly reviewed the three orders generally, the lecturer went on to notice them more minutely, taking one or two leading types of each order.

One curious instance taken was the Syrphus Lucorum; the female of the Insect, when she lays her eggs, chooses leaves which are covered with aphides, and upon them she lays her eggs, never placing two eggs near one another. When the Larva is hatched, it finds itself lying in the midst of its helpless prey: then, clinging firmly to the leaf with the tenacles at the under side of the body, it stretches out the fore part of its body, and with a curious apparatus, belonging to its mouth, seizes the aphis, which it then pulls from its hold on the leaf and extends

aloft, so as to render its struggles useless, and finally proceeds to suck its juices.

Having more minutely described the three classes of Flies, he proceeded to show in a brief sketch what was the purpose and office which they perform in Nature.

One great work, which has lately been discovered to be due almost entirely to Flies, is the fructification of flowers. This is effected by the constant passage of Flies from flower to flower in search of honey. When a fly settles upon a flower, it rubs off upon itself some of the ripe pollen, which it carries off to another plant, and this, provided it be of the same kind as the former is then fructified by the ripe pollen brought to it from the first.

At the close of the lecture Mr. Carr spoke a few words about the origin of these essays, and said that he had listened with great pleasure to the lecture.

He then exhibited a wasps' nest which had been found on a gooseberry bush in his garden. A large nest had already been taken from the bush, the one exhibited was taken only two days and a night after the removal of the first.

Saturday, October 17th.

V. L. Johnstone gave a lecture on "The Roman baths at Bath."

The lecturer began by asking his audience to consider themselves at Bath, while he shewed them over the Roman baths there. He related the legendary account of the discovery of the healing powers of the waters, viz. the leprous swineherd and his leprous pigs who were all restored to health by wallowing in the mud. He then went on to the baths themselves and first exhibited on the screen a photograph of the celebrated pump room, which was well appreciated by the audience, as indeed were all the views. He then exhibited two plans shewing the shape and form of the old and new baths, and some photographic views of various parts of the Roman remains giving a very good idea of what the place is like. We were told how a cat (not a Roman one!) was found alive during one of the excavations having apparently been washed down a disused drain. The lecturer concluded by giving several details concerning different parts of the baths.

C. E. Williams, Esq., in moving a vote of thanks, said that he thought the lecturer had made a mistake in saying that the cat was not Roman, for that a Roman cat should have been preserved so long in these baths would have been a splendid advertisement as to the sanitary powers of the waters.

Present, about 45.

Saturday, October 31st.

W. N. Shaw, Esq. gave a lecture on "Knots."

Some years ago a well-known spiritualist professed to be able to tie a knot in a closed string. Although this never has been and never can be accomplished in space of three dimensions, yet there are ways in which rings of paper may be made such that when cut along their length the result may be a single ring with a more or less complicated knot in it.

A knot may be defined mathematically as a closed line which cannot be deformed into a circle. It must be carefully distinguished from a link; two closed rings may be linked on to one another as in a chain without being knotted at all. Knots are classified according to the number of times the string crosses itself when the knot is reduced to its simplest form. They may be complicated by nugatory crossings, *i.e.* crossings which can be removed without severing the ring. Drawings of different knots with 3, 4, 5 and 6 crossings were shewn. The distinction between right and left handed knots was next pointed out. When a left hand is held before a looking glass its reflection—or perversion as it is called—appears as a right hand, but just as a left hand will never go into a right hand glove, so while a left handed knot when reflected appears as a right handed knot, if a knot has an uneven number of crossings it can never by any amount of adjustment be transformed into its perversion. Knots with an even number of crossings can be so transformed and hence are called amphicheiral, after the analogy of a person whose hands are both alike.

The lecturer then shewed a number of paper rings in which—before they had been joined together—one of the ends had been given one, two, or more half twists. Taking a ring of the simplest kind with only one half twist, he shewed that on cutting it down the middle, lengthways, only one ring was obtained in which however there were four half twists.

Substituting a ring with two half twists and cutting as before two rings were obtained each like the original ring, the two being linked together. When a ring with three half turns was taken a single ring was again obtained, but this time it was twisted into a true knot of threefold knottiness.

In general, when a ring with an odd number of half twists (greater than one) was cut, a single ring resulted with a knot, the complexity of which was greater the greater the number of twists in the original ring. When the ring had an even number of half twists two rings were obtained linked or twisted into one another.

It was also pointed out that when the ring had an odd number of half twists it had in reality only one side and only one edge.

Experiments were then exhibited which had been suggested to the lecturer by Prof. O. Simony of Vienna.

Some twisted rings were cut round at a distance of one third of the breadth of the paper from the edge. When this was done two rings were always obtained which were tied or twisted together in a manner depending upon the number of twists in the original ring.

A piece of paper cut in the shape of a large X was then taken and the adjacent ends joined in two pairs, each pair forming a ring with three half twists. When this was cut as before a continuous ring was obtained with two knots. Finally a six rayed star was taken and adjacent ends joined in the same way forming three rings, when this was cut the resulting ring was found to contain three true knots.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, November 21st.

Professor W. H. Flower, F. R. S., gave a lecture on "Birds which cannot fly."

No vertebrated animals possess more than two pairs of limbs and in some, one—or in the serpent even both—of these are suppressed. In most birds the wing, which corresponds to our arms or to the fore leg of a quadruped, is well developed and it is present in all existing species though sometimes in a very rudimentary condition. The bones in a bird's wing correspond very closely with those in our arms, but no existing bird shews a trace of more than three fingers. To these bones are attached feathers, those above the joint which corresponds to our wrist being called secondary feathers, and the great ones below the wrist primary feathers. When we examine the barbs of one of these primary feathers from a bird which can fly we find, along the edge of each, a series of small elastic hooks which, catching into those of the adjacent barbs, hold the barbs together, and so give the wing the consistence necessary to enable the bird to raise itself in the air. The barbs of the Ostrich's feathers not being hooked in this way its wings are of no use for flight.

Birds are divided by Zoologists into two distinct groups. Those of the first and more numerous group are called Carinatæ, from their having a keel to the breast bone to which are attached the muscles of the wing, and on the size and development of which the power of flight very largely depends. The second group, the Ratitæ, have flat raft-like breast bones and none of these have the power of flight.

All existing British birds can fly, but one species—the Great Auk or Gair-fowl—which had not this power has become extinct only during recent years. In the sixteenth century these birds were very numerous on Penguin Island—a small island off the south coast of Newfoundland—as we learn from Hakluyt's account of Mr. Hore's visit in 1536 and from Sir Humphry Gilbert's voyage in 1583. They were good food and very easy to catch and consequently were practically eaten up by the whalers who used to lay a plank from the shore to a boat and then, surrounding the birds, drive them on board. The last two captured were taken in 1844 off the south coast of Iceland, and are now preserved in spirits in the Royal Museum at Copenhagen. There have since been various reports of others having been seen but these reports are open to grave doubts and certainly none have been caught. The last time that a Great Auk's egg was in the market two of them were sold for two hundred guineas.

The Great Auk was a sea bird, and although its small wings were not powerful enough to raise it in the air they were of great use for diving and swimming under water and so enabling the bird to catch the fish on which it lived. In this respect they resembled the flippers of the Penguin—a bird found only in the Southern Hemisphere—in which the wing has been reduced to a kind of small paddle. Thousands of these birds are caught every year and boiled down for the sake of their oil, and in this way it is not unlikely that they will be exterminated as the Great Auk has been, but being more numerous, and harder to get at, their end will not be just yet.

In New Zealand there are a large number of birds which cannot fly, among which are the Owl-Parrot, the Ground Parrot, the Weka Rail and the Notornis a bird something like, but larger than, the Coot, which was first known from the discovery of its skeleton. The living bird was not caught till 1849 and in all only three live specimens have ever been found. It is now probably extinct. The reason why there should have been so many birds without power of flight in New Zealand is probably that among its fauna were no four footed animals. In England if a bird cannot fly it is caught by a cat or a weasel or some such animal, but in New Zealand the only enemies a bird had to contend against were those of its own tribe, such as the Hawk, which would be more likely to seize a bird on the wing than on the ground, and so flying, being a positive disadvantage, went out of fashion.

In the Mascarenhas Islands, which were first discovered towards the end of the sixteenth century, were found three closely allied birds all incapable of flight. Mauritius was taken possession of in 1598, by Jacob Cornelius Van Neck, who in the published narrative of his voyage gives a drawing of the Dodo

which he describes as "tame and easily killed—for as there was no one to scare them they had no fear of us but kept their places and allowed us to kill them."

About 1638 a live Dodo was exhibited in London and a short account of it has been left by Sir Hamon Lestrange. In 1644 the Dutch colonised and permanently inhabited Mauritius, in 1681 the Dodo was still to be found there, but by 1693 it was probably extinct for in a careful enumeration of the animals found on the island at this date no mention is made of it. The extermination was probably due as in New Zealand to the introduction of mammals, and more especially to the pigs which made great havoc among the eggs of the Dodo.

Several fragments of Dodos may be seen in our Museums, but no complete specimens. Formerly there was one in the Ashmolean Museum at Oxford, but in 1755 it was destroyed by order of the Trustees, who seeing it very much out of order classed it as rubbish. The Curator saved the head and one foot which are now most valuable relics. A complete skeleton has been reconstructed from bones found in 1865, and during the present year more bones have been discovered.

The island of Rodriguez, 300 miles to the East of Mauritius, seems to have remained uninhabited until 1691, when some French Protestant refugees settled upon it. Their commander, François Leguat, has left us the only account we possess of a bird called the Solitaire found on the island; his description was illustrated by one wood cut. The bird soon became extinct and had almost passed out of memory, when in 1793 some bones were discovered which were sent to Cuvier in Paris where they now are. More recently large numbers of these bones have been found and a complete skeleton reconstructed.

In the island of Bourbon or Réunion, 100 miles to the west of Mauritius, was a bird—the White Dodo—of which even less is known. A short description by Captain Castleton, who visited the island in 1613, and one solitary drawing are all that we have. No bones have as yet been found.

These three birds are all so closely allied that they must have descended from some common stock. There are many reasons for believing that the Mascarenhas islands are mountain summits of an old continent on which the ancestors of the birds lived. As the continent sank connection between its parts was destroyed, and in course of time the birds living on the different islands underwent modifications resulting in the production of the species just noticed, and which have now all been destroyed by man.

All the birds mentioned so far belong to the Carinatæ or keeled group. Of the Ratitæ, or group with a flat breast bone, none can possibly fly. Among these are the Ostrich, Cassowary, Emu, and Apteryx. Also the Great Dinornis, an extinct

inhabitant of New Zealand. Numerous remains of this bird have been found but no trace of a wing bone, even the socket of the shoulder joint in which the wing should rest is absent, and hence the Dinornis had, as far as we know, not even a rudimentary wing.

The origin and early history of birds is involved in obscurity, but in all probability the power of flight, not originally possessed, has been gradually developed. What the primitive bird was like we know not, but we may be tolerably sure that although it had a rudimentary wing it was none the less a bird which could not fly.

The lecture was illustrated by a number of admirable drawings of the birds referred to.

Present, about 95.

A vote of thanks to the lecturer was proposed by Mr. Irving.

The President announced the receipt of the Report of the Smithsonian Institution for 1883 and proposed a vote of thanks to the Board of Regents.

Saturday, December 5th.

The Rev. F. J. Tuck gave a lecture on "Six weeks in Norway."

The lecturer began by disclaiming any intention of giving a geographical or historical account of the country, and said that he desired to interest those present by the exhibition of a number of slides, so that many might be induced to follow his example, and spend their Summer holidays in Norway. He was greatly indebted for the loan of all the uncoloured slides to Mr. William Fairbank of Windsor, who had increased the pleasure of travelling by taking photographs of a great number of very beautiful scenes in the interior of the country, whither the professional photographer never attempted to penetrate.

The usual routes to Norway were from Hull or Newcastle to Bergen on the West Coast; the lecturer went from Hull to Christiania, a passage of rather more than two days across the North Sea, whose roughness deters many from crossing, and so prevents the country from being spoilt by tourists as Switzerland had been. Some slides were then shewn of the harbour of Christiania and several of the public buildings, notably the Palace and University. The route taken northwards by Lillehammer to Throndjem necessitates the employment of carrioles for about two hundred and fifty miles; a slide and model of a carriole were then shewn, and a description given of the usual

mode of posting. The town of Throndjem, its splendid Cathedral and the falls of the Lerfts in the vicinity were exhibited. The route by sea *viâ* Christiansund and Molde was traced to the Romsdal, and views were given of this magnificent valley, in which for some distance abrupt cliffs of 4000 feet, rendered picturesque from the jagged pinnacles, run parallel not so much as three hundred yards apart, with a broad and rapid river between. After visiting the Geiranger Fjord, one of the finest in Norway, the lecturer spent ten days among the high mountains of the Jotunheim, which are between seven and eight thousand feet high, with a snow line about three thousand feet lower than in Switzerland, so that, but for the absence of large glaciers the scenery resembles that of the Zermatt district. This part of the route was profusely illustrated by the excellent views of Mr. Fairbank which were very much appreciated. As time was short the journey by Nystuen on the Fille Fjeld to Lærdalsoren on the Sogne Fjord, and thence by the Vetti Fos over the Horunger range to Fortun was briefly sketched out and illustrated by slides; and views were given of the Naero Fjord, Stalheim Clef, Gutvangen, Vossevangen, the Hardanger Fjord and Bergen. The lecturer pointed out that the charm of travelling through the country was much enhanced by the inhabitants, whose kindness and courtesy were marked features in their character. Models were exhibited of a carriole and stolkjære, the carriage and cart of Norway; of the handbox of the peasants and other national peculiarities; also figures dressed up in the singular costumes still to be seen on the Hardanger Fjord.

Votes of thanks to the lecturer and to Mr. Fairbank, who had so kindly allowed his photographs to be exhibited, were proposed by Mr. Penny.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Monday, February 2nd.

At a P.B.M., Prince Francis of Teck, H. B. Wilkinson, R. Crawley, H. J. A. Banks, C. D. Boyle, were elected Associates.

J. W. Cave, G. Laing were elected to serve on the Committee for the term.

At a Committee meeting Ll. Campbell, A. J. Macandrew were elected Members.

Wednesday, February 18th.

At a P.B.M., F. Lyon was elected to be Geological Album Keeper, and V. L. Johnstone to be Ethnological Album Keeper.

P. B Norris, G. P. Tharp, E. C. Knight, R. H. M. Currie, H. Laing, L. F. Hore, J. Hay, were elected Associates.

Saturday, May 2nd.

At a P.B.M. V. L. Johnstone was elected Treasurer.

A vote of thanks was passed to E. H. Stafford, retiring Treasurer.

Ll. Campbell was elected deputy Meteorological Album Keeper, in the absence of R. S. Heywood.

A. D. Hanbury, A. R. M.-Stuart-Wortley, D. A. Callender, A. St. V. Guise, W. D. Sclater-Booth, C. Philcox, H. A. Kelso, E. F. Knight, A. C. Deane, C. L. Hulbert, P. M. Coode, W. Carver, S. T. Hankey, G. Dumas, H. W. Walton-Wilson, R. N. Tytler, F. R. Slade, J. Johnston were elected Associates.

J. W. Cave and Prince Christian were elected to serve on the Committee for the term.

T. H. French, Esq., H. W. Brougham, Esq., R. Moore, Esq., Rev. H. Wood, J. Y. Pearson, Esq., W. A. J. Ford, Esq., R. S. de Havilland, Esq. were elected Honorary Members.

At a Committee Meeting, V. L. Johnstone, A. W. Blunt, A. W. Fox, A. Stanley, R. O. Crewe-Read, J. C. M. Taylor were elected Members.

J. W. Cave, J. C. Inglis were elected judges for the Pender Prize.

Saturday, May 9th.

At a P.B.M., the President announced that it had been decided to convert the Hardinge into a Museum as soon as the new dormitories were completed, that a small Committee of Masters had been appointed to consider what steps should be taken and that the N.S.S. were invited to appoint two representatives to serve on that Committee.

V. L. Johnstone and J. S. Marriner were then elected.

S. D. B. Ketchen, F. A. Hutchinson, W. R. Collins, B. W. Peacock were elected Associates.

Thursday, June 11th.

At a P.B.M., W. H. Ruston, Esq., H. M. Elder, Esq., were elected Honorary Members.

O. D. Blunt, and R. Sparrow were elected Associates. J. E. Bates and H. S. Hardy were proposed for Associates.

The President then called the attention of the Society to the disturbance which had been created at the lecture on the previous Saturday, and named Prince Francis of Teck as having been one of those who contributed largely towards it.

After some discussion Prince Francis of Teck was suspended for the rest of the term by a vote of 5 out of the 7 members present.

Saturday, July 25th.

J. W. Williams, H. W. Cutbill were proposed for Associates.

J. C. Inglis resigned the office of Secretary, and a vote of thanks was passed to him.

Ll. Campbell resigned the office of deputy Meteorological Album Keeper, and a vote of thanks was carried.

J. S. Marriner resigned the office of Entomological Album Keeper and was re-elected, after a vote of thanks had been passed.

V. L. Johnstone resigned the offices of Treasurer and Ethnological Album Keeper.

V. L. Johnstone was then elected Secretary, R. S. Heywood, Treasurer, R. O. Crewe-Read, Botanical Album Keeper, J. R. Barkworth, Ethnological Album Keeper.

Saturday, September 26th.

R. S. Heywood resigned the office of Meteorological Album Keeper, a vote of thanks was passed for his services.

J. R. Barkworth was then elected Meteorological Album Keeper.

J. W. Williams, W. A. Margesson, F. G. Young, E. G. Elton, B. H. Rooke, R. H. Hunter-Weston, R. N. De la Bère, A. J. Durrell, R. C. Gayer, S. S. Flower, E. M. Hughes, W. B. Heywood were elected Associates.

Prince Christian, A. W. Fox were elected to serve on the Committee for the term.

At a Committee Meeting J. W. Weigall, F. W. Parker, J. R. Barkworth, A. B. Ward, G. V. Davidson were elected Members.

Saturday, October 3rd.

J. E. Bates, H. S. Hardy, (proposed June 11th.), were elected Associates, taking precedence of those elected Sept. 26th.

R. B. Gosset, and E. L. Humfrey were elected Associates.
C. B. Bonham was proposed as an Associate.

Rev. P. E. Raynor, Rev. A. R. Sharpe, H. E. Huntington, Esq. were elected Honorary Members.

EXCURSIONS.

On Thursday, November 5th, some members of the Committee went with the President to visit the Royal Mint. After waiting three quarters of an hour at Farnborough we reached Waterloo half an hour after time, and went straight to our destination. We were there shown the process of casting the ingots, which are then rolled between heavy rollers till they acquire the right thickness. The slips are then passed through a machine which cuts out of them a number of round discs, these are then annealed, *i.e.* softened by being heated and allowed to cool slowly, when they are ready to be stamped. But perhaps the most interesting part was the weighing room, where the finished the coins were tested in machines which acted automatically, dividing those of right weight from the rest. We were told that about quarter of the coins made are rejected and have to be cast again. We then came back, reaching College about half past six, and in conclusion we must thank Mr. Saunder for the kind hospitality he shewed us on our return.

PRIZES.

A prize of the value of £5 is given annually by Mrs. Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition :

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two ordinary Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That preference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but

should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1885 was awarded to J. S. Marriner for an essay on "British Flies."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The first prize, for 1885, was awarded to H. B. Wilkinson, the second to R. Sparrow, and an extra prize given by Mr. Penny to E. Rickards.

PHENOLOGICAL REPORT.

During the early months of the year the following observations were made of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list.

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &c.)

1	**Anemone nemorosa** (Wood Anemone) not found till April, plentiful by	April	20
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)		
3	*Ranunculis acris* (Upright Crowfoot)		
4	**Caltha palustris** (Marsh Marigold) plentiful by	April	18
5	*Papaver Rhœas* (Red Poppy)		
6	*Nasturtium officinale* (Water Cress)		
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)	April	25
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)	Mar.	29
9	*Draba Verna* (Whitlow Grass)	Mar.	16
10	*Viola odorata* (Sweet Violet) Mar. 3, plentiful by	Mar.	20
11	*Polygala vulgaris* (Milkwort)	April	27
12	*Lychnis Flos-cuculi* (Ragged Robin)	May	30
13	*Stellaria Holostea* (Greater Stitchwort)	April	27
14	**Malva sylvestris** (Common Mallow)		
15	*Hypericum tetrapterum* (Square St. John's Wort)		
16	,, *pulchrum* (Upright St. John's Wort)		
17	**Geranium Robertianum** (Herb Robert)	May	10
18	*Euonymus europæus* (Spindle-tree)		
19	*Acer Pseudo-platanus* (Sycamore)		
20	*Æsculus Hippocastanum* (Horse Chesnut)	May	21
21	*Cytisus Laburnum* (Laburnum)		
22	**Trifolium repens** (Dutch Clover)		
23	*Lotus corniculatus* (Bird's Foot Trefoil)		
24	*Vicia Cracca* (Tufted Vetch)	May	12
25	,, *sepium* (Bush Vetch)		
26	*Lathyrus pratensis* (Meadow Vetchling)		
27	**Prunus spinosa** (Sloe, or Black-thorn)	April	24
28	*Spiræa Ulmaria* (Meadow-Sweet)		
29	*Potentilla anserina* (Silver-weed)		
30	*Rosa canina* (Dog Rose)		
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)	May	9
32	*Cratægus Oxyacantha* (Hawthorn)	May	19
33	*Epilobium hirsutum* (Great Hairy Willow-herb)		
34	,, *montanum* (Broad Willow-herb)		
35	*Angelica sylvestris* (Wild Angelica)		
36	*Daucus Carota* (Wild Carrot)		
37	**Hedera Helix** (Ivy)		
38	*Cornus sanguinea* (Dog-wood)		
39	*Syringa vulgaris* (Lilac)		
40	*Galium Aparine* (Cleavers)	May	17
41	,, *verum* (Yellow Bedstraw)		
42	*Dipsacus sylvestris* (Wild Teasel)		

43 *Scabiosa succisa* (Devil's-bit)
44 *Petasites vulgaris* (Butter-bur)
45 **Tussilago Farfara** (Coltsfoot) Mar. 12
46 **Achillea Millefolium** (Milfoil, or Yarrow)
47 *Chrysanthemum Leucanthemum* (Ox-eye) May 21
48 *Artemisia vulgaris* (Mugwort)
49 *Senecio Jacobæa* (Ragwort
50 **Centaurea nigra** (Black Knap-weed)
51 *Carduus lanceolatus* (Spear Thistle)
52 ,, *arvensis* (Field Thistle)
53 *Sonchus arvensis* (Corn Sow Thistle)
54 *Hieracium Pilosella* (Mouse-ear or Hawk-weed)
55 **Campanula rotundifolia** (Hair-bell)
56 *Ligustrum vulgare* (Privet)
57 **Convolvus sepium** (Greater Bind-weed)
58 *Symphytum officinale* (Comfrey)
59 *Pedicularis sylvatica* (Red Rattle) April 26
60 *Veronica Chamædrys* (Germander Speedwell) Mar. 9
61 *Mentha aquatica* (Water Mint)
62 *Thymus Serpyllum* (Wild Thyme)
63 *Prunella vulgaris* (Self-heal)
64 *Nepeta Glechoma* (Ground Ivy) April 12
65 *Galeopsis Tetrahit* (Hemp-nettle)
66 *Stachys sylvatica* (Hedge Woundwort)
67 *Ajuga reptans* (Bugle)
68 **Primula veris** (Cowslip) April 26
69 *Plantago lanceolata* (Ribwort Plantain)
70 *Mercurialis perennis* (Dog's Mercury) Mar. 7
71 *Ulmus montana* (Wych Elm) Mar. 17
72 *Salix Caprea* (Great Sallow) flowered in middle of January
not generally out till Feb. 15
73 *Fagus sylvatica* (Beech)
74 *Corylus Avellana* (Hazel)
75 *Orchis maculata* (Spotted Orchis) May 30
76 *Iris Pseud-acorus* (Yellow Iris)
77 *Narcissus Pseudo-narcissus* (Daffodil) Feb. 22
78 *Galanthus nivalis* (Snowdrop)
79 **Scilla nutans** (Blule-bel) plentiful by April 25

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY.)

80 *Melolontha vulgaris* (Cock Chafer, or May Bug)
81 *Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)
82 *Timarcha lævigata* (Bloody-nose Beetle)
83 *Lampyris noctiluca* (Glow-worm)
84 *Apis mellifica* (Honey Bee, or Common Hive Bee)
85 *Vespa vulgaris* (Wasp)
86 *Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)
87 ,, *Rapæ* (Small Garden White or Cabbage Butterfly) May 4
88 *Anthocharis Cardamines* (Orange-tip Butterfly)
89 *Epinephile Janira* (Meadow-browu Butterfly)
90 *Bibio Marci* (St. Mark's Fly)

BIRDS.

(ARRIVAL; SONG; NESTING; FIRST EGG.)

91 *Strix aluco* (Brown Owl)
92 *Muscicapa grisola* (Flycatcher)
93 *Turdus musicus* (Song Thrush) sg. Jan. 29
94 „ *pilaris* (Fieldfare)
95 *Daulias luscinia* (Nightingale)
96 *Saxicola œnanthe* (Wheatear)
97 *Phylloscopus trochilus* (Willow Wren)
98 „ *collybita* (Chiff chaff)
99 *Alauda arvensis* (Sky-lark) sg. Feb. 1 (attempt), in voice Feb. 12
100 *Fringilla cœlebs* (Chaffinch) arr. Jan. 4, sg. Jan. 23
101 *Corvus frugilegus* (Rook) nesting Feb. 24, near Wokingham
102 *Cuculus canorus* (Cuckoo) sg. April 26
103 *Hirundo rustica* (Swallow, or Chimney Swallow) arr. April 17
104 „ *urbica* (House Martin)
105 „ *riparia* (Sand-Martin)
106 *Cypselus apus* (Swift) near Yateley May 7
107 *Caprimulgus europæus* (Goatsucker, or Fern-owl)
108 *Columba turtur* (Turtle Dove)
109 *Perdix cinerea* (Partridge)
110 *Scolopax rusticola* (Woodcock)
111 *Crex pratensis* (Corncrake, or Land Rail)

MISCELLANEOUS.

(FIRST APPEARANCE.)

112 Frog Spawn Feb. 25

METEOROLOGICAL REPORT.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·32	33·5	25·5	55·0	28·4			8		E.
2	30·05	33·7	27·4	37·1	29·9	28·8	83	10		S.E.
3	29·90	34·4	29·0	39·0	33·3	32·1	88	10		S.E.
4	30·09	43·5	32·1	45·0	33·9	33·5	96	10		S.E.
5	29·95	42·8	32·4	51·2	43·9	43·0	92	10	·05	S.E.
6	30·16	40·7	26·5	68·9	29·2	28·8	92	0		S.W.
7	30·37	41·5	26·5	69·4	30·9	30·7	96	0	·03	S.
8	29·91	38·5	28·4	63·1	37·7	36·2	87	6	·18	S.W.
9	·71	45·7	24·7	73·1				2	·22	S.
10	29·37	49·1	29·4	56·3	46·0	45·8	99	10	·23	S.W.
11	28·91	43·8	36·2	80·7	39·6	36·3	74	4	·01	S.W.
12	29·54	36·0	30·1	62·3	32·9	29·1	58	3		N.W.
13	·60	33·5	28·5	54·3	31·7	29·4	72	10		N.W.
14	·71	35·5	27·3	56·2	31·9	30·4	81	10	·13	N.E.
15	·92	35·9	30·2		35·3	35·0	97	10	·07	N.E.
16	·97	36·7	32·3	41·9	34·8	32·6	78	10	·05	N.E.
17	29·98	36·3	31·8	48·5	34·2	33·8	96	10	·01	N.E.
18	30·03	36·5	32.4	42·9	36·3	35·0	88	10		S.E.
19	·18	36·1	32·4	35·9	34·2	33·8	96	10	·01	N.E.
20	30·05	31·8	30·2	34·1	31·4	30·9	77	10		N.E.
21	29·91	31·2	23·5	49·3	26·0	25·0	76	10		S.E.
22	·92	34·5	24·5	42·3	32·2	31·7	93	10		S.E.
23	29·99	37·7	25·5	67·4	31·0	29·9	85	10		S.E.
24	30·02	36·3	29·1	46·9	31·2	30·7	93	10		E.
25	30·06	42·4	22·2	74·8	32·6	31·6	87	7	·01	E.
26	29·94	44·0	28·6	48·0	38·6	38·6	100	10	·02	S.E.
27	·68	50·8	38·0	36·4	43·9	43·6	97	10	·05	S.
28	·79	51·1	42·8	52·9	46·9	44·9	86	10	·04	S.
29	·45	51·8	46·1	58·6	50·9	48·2	81	7	·35	S.E.
30	·26	49·4	44·9	59·3	45·6	45·2	97	10	·26	S.E.
31	29·05	45·8	38·7	67·3	48·6	42·2	60	6	1·00	S.
Mean	29·80	40·0	30·9	55·6	36·1	35·1	86·4	8·2	Total 2·72	

FEBRUARY.

Date	Barom. Reduced.	Thermomometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1	29·23	49·0	39·7	80·5	41·5	40·9	95	10	·14	S.W.
2	·18	53·8	40·6	85·8	48·5	45·6	79	7	·09	S.
3	·16	46·8	40·3	73·6	42·9	41·9	92	5	·01	S.
4	·33	44·9	34·0	77·1	37·4	37·4	100	7	·24	S.W.
5	·39	46·5	31·0	88·0	37·7	35·8	83	6	·01	S.
6	·73	48·2	35·4	77·2	44·9	43·5	89	10	·15	S.
7	·54	50·3	39·1	91·3	42·9	41·5	89	2	·03	S.
8	·71	49·5	38·1	78·5	47·5	47·2	98	10	·31	S.E.
9	·59	46·4	35·9	91·1	37·5	34·8	77	0	·01	E.
10	·91	49·3	32·5	87·6	35·4	35·0	96	6	·01	
11	29·92	52·9	34·8	69·2	49·2	48·6	96	10	trace	S.
12	30·06	57·1	43·3	96·8	47·2	47·2	100	10	trace	S.
13	29·99	49·4	44·6	55·0	46·1	45·5	96	10	trace	S.W.
14	·71	49·3	45·5	51·8	46·4	45·8	96	10	·13	S.
15	·58	49·9	44·7	60·1	46·8	46·7	99	10	·48	S.
16	·36	} 50·4	45·6	} 69·3	48·0	47·9	99	10	} ·69	S.E.
17			} 31·8							
18	·54	43·9		86·3	34·3	33·6	93	0	trace	S.W.
19	·72	44·3	25·9	88·0	30·2	30·0	96	0	trace	N.E.
20	29·61	38·7	25·8	51·6	35·0	32·5	63	9		N.E.
21	30·08	41·9	22·9	85·9	29·7	27·4	67	9	·07	N.E.
22	29·77	45·6	29·0	53·8	39·7	39·1	95	10	·06	S.E.
23	·94	49·1	34·5	79·0	42·3	42·2	98	10	trace	S.
24	·72	51·4	40·9	94·4	45·5	42·6	79	0	·03	S.E.
25	29·81	51·0	44·8	80·8	45·6	45·4	99	10	·16	S.
26	30·01	50·4	41·6	76·3	44·4	43·3	92	9	·27	S.
27	29·76	53·2	43·8	82·1	46·8	45·9	99	10	·05	S.E
28	29·84	52·9	44·4	73·8	46·8	46·0	94	10	·02	S.
Mean	29·67	48·7	37·4	77·2	42·2	41·2	92	7·4	Total 2·96	

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·10	42·7	30·7	86·1	34·8	34·0	91	4	trace	N.E.
2	30·01	42·7	30·6	74·3	34·1	33·6	96	2	trace	S.E.
3	29·62		33·6	60·5	40·8	40·0	94	10	·60	S.E.
4	·36	54·6	33·8	104·1	44·4	43·6	94	1	·01	S.W.
5	·52	53·8	30·9	90·5	43·8	38·9	66	10	·03	S.
6	·22	48·6	35·2	56·0	36·4	34·8	86	10	trace	N.
7	·90	43·8	26·7	89·7	32·9	32·5	94	10	trace	N.E.
8	·84	43·4	23·6	80·2	34·1	32·6	85	6	·03	N.E.
9	29·92	43·4	31·1	105·1	36·9	35·4	87	1	trace	N.E.
10	30·24	41·6	25·3	76·9	32·8	31·4	82	0		N.
11	·42	41·3	29·5	73·5		39·4		8		N.E.
12	·40	49·4	25·2	94·0	38·5	32·8	58	0		E.
13	·42	47·8	33·0	92·2	39·9	38·2	87	10		N.E.
14	·51	47·8	36·6	90·6	38·0	37·0	91	10		N.
15	·46	56·8	25·5	97·9	36·4	35·8	95	0	trace	N.
16	·41	56·8	27·5	99·6	35·6	34·7	91	1		S.E.
17	30·13	54·4	32·3	99·7	39·3	37·0	82	0	·04	S.
18	29·56	47·9	36·2	96·5	41·3	39·2	84	4	·01	W.
19	30·01		30·3	98·6	44·3	41·9	82	1	trace	N.
20	29.82	59·6	31·5	105·6	40·0	39·7	98	10		S.W.
21	·82	48·5	33·8	109·0	41·6	38·6	77	9	·90	W.
22	29·89		26·6					10		N.
23	30·24	42·7		98·5	34·6	32·9	83	0	·01	N.
24	·20	44·0	27·5	92·8	35·9	34·4	87	10	·01	
25	·22	49·6	29·9	85·8	40·7	38·5	82	10	trace	
26	30·09	45·0	34·8	78·2	41·3	39·2	84	10	·07	S.
27	29·80	50·1	39·2	99·9	42·7	39·7	77	3		W.
28	30·28	50·6	28·5	100·6	39·3	38·7	95	0		W.
29	29·99	50·3	31·4	95·0	49·7	48·0	89	10		N.E.
30	30·04	53·4	33·8	98·2	41·9	39·7	83	7		N.
31	30·25	56·6	25·6	102·2	43·4	38·7	68	1		N.E.
Mean	30·22	53·1	30·1	91·2	40·2	39·6	85	5·4	Total 1·71	

APRIL.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	29·80	56·2	35·0	112·0	50·4	44·6	64	4	·10	S.W.
2	29·92	49·6	35·1	102·3	41·0	36·5	69	3		N.E.
3	30·16	50·4	27·4	90·1	40·9	36·7	68	2		N.E.
4	29·97	50·1	26·4	92·6	40·9	31·8	42	5		N.E.
5	·71	49·4	22·5	99·3	40·9	37·2	72	7	·38	N.E.
6	·28	50·4	39·1	103·9	42·2	41·0	90	8	·01	S.E.
7	·36	51·7	30·8	89·6	40·0	39·1	94	3		S.E.
8	·53	49·9	36·3	74·7	39·9	38·0	86	10		N.
9	·55	45·9	37·1	65·9	41·1	38·2	77	10		N.W.
10	·51	45·9	35·8	63·2	41·2	39·1	84	10	·14	N.W.
11	·52	47·2	37·3	75·2	39·9	39·8	99	10	·01	N.W.
12	·71	49·3	36·3	85·2	41·4	39·9	89	10		N.W.
13	·87	48·6	34·8	82·1	38·8	37·9	91	10		N.W.
14	·82	48·7	34·5	73·8	41·9	34·5	52	10		N.E.
15	·81	50·6	36·0	98·3	42·6	39·0	73	10	·19	N.E.
16	·66	50·6	38·5	90·2	43·6	42·6	92	10	·08	N.E.
17	29·94	62·3	39·8	104·4	47·0	44·9	86	3		N.E.
18	30·05	65·9	31·5	109·2	54·1	48·7	67	0		N.E.
19	·24	67·0	37·2	102·7	54·4	49·5	69	0		N.E.
20	·21	70·9	38·2	105·4	57·9	50·3	59	0		S.E.
21	30·17	68·0	39·8	114·2	59·7	50·2	52	0		S.W.
22	29·79	62·7	44·7	107·2	55·4	50·5	70	3		S.W.
23	·60	61·8	43·5	112·3	53·1	48·9	73	10	·22	S.W.
24	·59	58·2	39·3	109·8	47.7	47·0	96	10	·14	
25		58·7	46·9	108·6				8		S.
26	·51	59·2	45·3	114·5	52·6	49·4	79	8		S.E.
27	·65	61·1	35·7	112·2	55·7	50·6	70	4		S.
28	·65	63·4	37·7	115·4	59·1	50·0	54	0	·02	S.
29	·60	56·9	45·6	110·0	47·4	46·1	92	10		W.
30	29·81	59·6	31·4	110·6	51·6	47·9	76	3		S.
Mean	29·76	55·3	36·6	97·5	47·0	43·1	75	6·3	Total 1·29	

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1	29·55	55·5	37·0	95·8	48·9	46·9	86	10	·04	S.W.
2	·60	58·8	39·7	107·9	46·3	44·0	85	9	·40	W.
3	·61	59·6	33·8	113·4	51·8	48·1	52	1	·30	
4	·50	57·8	40·3	96·4	44·8	43·9	92	10	·18	N.
5	·49	59·6	40·4	105·3	45·5	44·1	90	10	·52	N.W.
6	·30	50·7	40·2	93·0	49·1	46·6	82	7	·40	
7			38·4							
8	·59	51·1		113·5	44·8	41·1	74	7	·15	W.
9	·88	54·2	30·5	109·8	48·9	44·5	71	1	·03	N.
10	·87	52·6	41·0	105·8	47·0	44·4	82	10	trace	W.
11	29·97	54·7	36·9	110·7	45·4	40·4	67	1		N.W.
12	30·11	57·2	30·0	105·4	48·9	41·0	52	0		N.
13	29·81	55·1		102·0	47·8	46·9	93	1		S.
14	·78	55·2	30·3	105·4	48·4	43·6	68	3	·01	S.
15	·90	58·1	36·5	108·6	48·8	48·3	97	8	·01	W.
16	·77	58·4	36·3	101·1	50·9	49·0	86	1	trace	N.W.
17	·70	53·8	40·8	109·1	49·6	44·1	66	7	·21	N.
18	·85	54·4	37·7	103·9	46·6	43·7	79	9	trace	W.
19	·94	51·9	35·3	109·1	49·4	48·1	92	9	·10	W.
20	·68	50·6	36·6	93·7	49·2	46·1	80	10	·37	N.W.
21	·31	52·2	38·2	98·3	49·6	48·9	96	10	·27	N.W.
22	·12	57·2	39·7	108·7	50·6	47·7	80	10	·32	W.
23	·59		41·9	110·1	53·0	47·5	67	6	·10	S.
24	·90	60·1	41·8	110·3	54·4	46·9	57	7		W.
25	·98	54·6	39·7	75·0	52·7	47·6	69	10	·12	S.
26	·95	55·8	45·4	76·4	55·6	52·0	80	10		S.W.
27	·94	60·8	46·4	113·2	55·9	53·2	83	5		S.
28	·83	63·1	47·6	113·5	57·7	55·2	83	10	·08	S.
29	·87	66·9	46·4	119·4	56·2	55·1	93	6		S.W.
30	29·99	60·9	46·1	114·2	55·0	55·0	100	7	trace	S.
31	30·01	62·8	41·2		57·9	57·8	99	7		W.
Mean	29·75	56·5	39·2	101·0	50·4	47·2	80	6·7	Total 3·61	

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·19	64.4	42·5	115·8	60·9	52·5	58	7		N.W.
2	30·21	76·3	44·4	105·5	62·2	55·7	64	0		S.
3	29·87		51·2	120·6	76·1	66·4	56	0		S.
4	·91	80·4	54·3	126·2	67·6	65·1	86	1	·51	S.W.
5			55·2							
6	·92	64·7		107·1	57·9	57·9	100	10	·05	S.
7	·80		55·3	108·1	63·8	60·4	80	8	·37	S.
8	·91		50·7	140·7	64·6	58·1	65	10	·43	W.
9	29·90	66·1	51·3	117·0	63·1	52·1	55	10	·05	S.W.
10	30·26	62·2	44·2	120·5	55·6	47·8	57	1		N.E.
11	·30	66·4	35·7	109·5	58·1	49·7	55	1		S.
12	·29	68·0	35·0	113·8	63·6	52·8	49	0		S.
13	·03	76·5	34·6	119·0	68·4	54·6	40	0		S.W.
14	·00	75·9	44·3	120·8	71·4	59·3	40	0		S.
15	30·02	67·6	51·0	114·5	65·2	59·0	67	10		E.
16	29·95	68·0	47·9	116·6	65·4	56·1	55	7		N.
17	29·97	69·9	45·8	117·5	67·2	56·5	50	10		N.E.
18	30·05		50·0	112·8	68·4	57·2	48	3		S.
19	29·64	68·9	50·1	123·8	63·1	54·6	57	5	·46	W.
20	·50	63·7	40·7	115·4	56.4	51·7	72	4	·06	S.W.
21	29·90	63·2	45·7	116·7	54·0	48·5	67	10		W.
22	30·08	63·7	45·0	113·5	58.3	52·0	65	6	·01	W.
23	29·78	61·8	45·7	110·0	54·9	51·6	79	9		N.W.
24	·87	63·2	43·6	111·6	54·6	51·3	79	9		N.E.
25	·84	59·9	45·7	93·3	53·2	50·2	80	10	·13	S.W.
26	·82	69·4	44·4	105·9	52·7	50·2	84	7	·02	W.
27	29·86	72·9	42·5	121·3	58·0	53·7	75	0		N.
28	30·08	77·9	43·2	133·0	53·8	50·5	79	8		N.E.
29	29·89	76·0	43·2	120·1	54·8	53·7	93	10		S.E.
30	29·88	69.5	41·9	124·9	56·6	52·1	73	0		S.
Mean	30·96	68·7	45·7	116·4	61·0	54·6	66	5·4	Total 2·09	

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In	°	°	°	°	°	°/°	0—10	In.	
1	29·92	72·9	43·8	121·0	53·1	50·2	80	0		S.W.
2	·96	75·6	40·2	116·6	58·3	53·7	73	0		S.
3	·87	76·1	43·4	120·8	59·7	53·9	67	0		S.E.
4	·88	70·0	41·9	112·6	55·2	52·6	83	3		S.
5	29·95	71·3	42·8	117·9	58·6	51·3	60	2		S.
6	30·01	68·9	45·5	116·1	56·3	53·2	81	0		N.E.
7	·06	72·1	42·8	127·9	57·8	54·7	81	1		S.
8	·08	76·7	44·9	125·3	55·7	50·6	70	0		S.
9	·10	75·9	43·0	116·5	63·4	62·0	92	0		S.
10	·06	78·0	43·9	119·6	64·2	60·2	77	0		S.
11	·11	77·9	40·4	128·1	63·1	60·6	86	0		S.
12	30·13	76·9	40·5	116·3	62·6	60·1	86	0		S.
13	29·99	68·6	46·9	125·9	60·9	60·9	100	1		
14	30·14		44·3		60·0	55·2	72	0		S.W.
15		72·0		111·9					·16	
16	29·82	76·5	47·3	103·6	63·1	61·2	88	10	·03	W.
17	29·93		43·5		64·2	60·1	77	10		S.W.
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29	30·28	67·7		122·6				10		N.
30	·25	70·9	54·5	115·2	56·7	53·3	79	10		N.
31	30·18	69·7	52·6	115·1	56·0	51·9	75	10		N.E.
Mean	30·04	73·2	44·6	112·9	59·3	54·7	79	3·0	Total ·19	

From the 18th to the 29th inclusive the readings were taken but afterwards were unfortunately lost.

AUGUST.

Date	Barom. Reduced.	Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
		Thermometers.								
	In.	°	°	°	°	°	%	0—10	In.	
1	30·07	65·5	51·8	115·3	54·7	50·2	72	10		N.E.
2	·05	66·0	52·3	113·7	56·2	52·2	75	10		N.
3	30·01	65·2	49·2	120·4	58·8	52·3	64	8		N.
4	29·88	69·2	51·5	120·4	65·1	56·1	55	4		S.E.
5	·88	68·6	50·6	109·8	58·3	55·0	80	8	·06	N.W.
6	·89	70·3	42·8	126·4	61·9	56·0	68	0	·01	N.W.
7	·73	69·7	48·7	115·3	60·4	54·0	64	5	·24	E.
8	·84	68·9	51·3	127·4	62·4	57·1	71	7	·03	S.W.
9	·92	68·6	52·6	115·0	58·0	56·1	88	10	·01	S.W.
10	·61	70·5	56·2	121·9	63·1	60·7	86	10		S.W.
11	·69	70·4	53·8	110·5	61·3	54·8	64	8		W.
12	·75	70·5	49·9	117·3	60·6	50·5	50	9	·25	S.W.
13	29·89	70·3	47·7	117·4	56·9	50·1	66	3		N.W.
14	30·25	70·2	37·1	119·9	55·9	50·5	67	2		N.W.
15	·25	71·0	42·0	115·6	61·9	53·2	56	0		N.W.
16	·18	75·2	44·5	119·6	64·2	55·4	56	1		S.W.
17	·07	78·0	45·1	124·8	65·4	56·5	57	0		S.W.
18	·05	72·5	54·6	127·3	61·0	55·0	66	5		S.W.
19	30·04	72·4	37·8	94·6	52·9	49·4	78	10		W.
20	29·89	63·0	45·9	114·1	52·9	49·5	78	10	·14	W.
21	·83	62·9	49·5	90·1	56·0	51·3	54	7	·05	N.W.
22	·79	60·7	45·1	97·2	54·0	53·6	97	10		N.W.
23	·85	64·7	42·7	111.4	53·0	52·0	93	10		N.W.
24	·94	68·8	43·2	119·9	57·5	55·1	85	10		N.
25	·97	70·7	46·6	114·8	56·4	55·5	94	0		N.
26	·92	69·7	46·4	123·9	61·5	57·9	78	7	·04	N.E.
27	·84	61·7	50·1	102·4	56·4	56·1	99	10	·01	E.
28	·76	62·0	51·6	102·1	58·4	55·0	79	7		N.E.
29	·76	65·3	47·7	116·6	57·7	56·1	89	7		N.E.
30	·94	59·1	41·3	122·3	54·9	48·9	65	7		N.E.
31	29·97	58·9	47·4	101·7	56·4	53·2	80	10	·01	E.
Mean	29·92	67·8	46·7	114·5	58·5	53·8	73	6·6	Total ·85	

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1	30·02	64·3	43·2	112·3	57·7	52·3	69	8		N.E.
2	29·88	62·7	44·9	103·3	57·0	55·1	88	10	·47	E.
3	·57	68·8	56·0	121·5	62·0	59·2	83	4	·01	S.E.
4	·55	66·7	50·0	111·7	60·1	57·5	84	6	·02	S.W.
5	·52	67·7	49·6	111·3	60·2	57·0	81	3	·15	S.W.
6	·63	67·9	45·2	120·4	59·4	56·5	82	5	·32	S.W.
7	·52	67·9	51·0	96·4	57·6	57·0	96	8	·12	S.W.
8	·73	67·7	49·1	114·4	58·8	55·8	81	3	·26	S.W.
9	·66	63·7	48·5	112·6	57·1	52·5	72	2		S.W.
10	·81	63·7	47·5	96·2	55·9	53·3	88	9	·19	S.W.
11	·48	60·2	47·4	104·2	49·0	48·5	97	10	·09	S.W.
12	·88	61·5	46·2	91·8	52·9	52·7	99	10	·35	S.W.
13	·84	63·7	52·1	102·4	57·5	55·6	88	7		S.W.
14	·89	65·7	49·8	103·2	61·0	60·8	99	10		S.W.
15	·84	73·8	49·9	115·9	63·9	61·5	86	2	·04	S.W.
16	·98	65·2	52·1	102·4	57·9	56·8	93	10	·47	S.W.
17	·90	60·9	51·1	103·0	53·2	53·1	99	10	·02	E.
18	29·98	} 63·2	41·4	} 106·8	52·9	53·0	100	10	} ·18	N.E.
19			} 42·1							
20	30·05	64·8		113·4	53·9	53·0	94	2	·05	N.W.
21	·06	60·2	54·0	109·9	55·9	54·9	93	7		N.W.
22	·55	66·8	41·3	111·6	53·4	53·4	100	10		S.E.
23	·13	66·5	52·5	110·1	61·9	60·3	90	8	·07	S.
24	30·06	55·4	42·8	97·5	49·9	47·7	85	2		N.
25	29·85	51·6	38·1	99·0	48·1	45·8	84	6	·02	N.W.
26	·84	51·3	30·8	99·2	43·8	42·5	91	3		N.W.
27	·84	49·3	29·3	89·6	43·4	42·7	95	9	·06	N.W.
28	·96	56·4	31·5	101·6	41·9	41·2	95	1	·35	N.E.
29	.60	60·7	42·0	91·6	56·1	56·1	100	9		W.
30	29·60	59·0	44·7	87·2	55·5	53·8	89	10	·13	S.
Mean	29·84	62·7	45·7	104·8	55·1	53·5	90	6·7	Total 3·37	

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·55	56·9	43·1	113·7	49·5	46·7	81	2	·02	S.W.
2	·94	58·5	44·1	103·0	51·9	51·2	94	10	·09	W.
3	·81	57·9	45·1	108·7	50·9	48·8	86	1		W.
4	·87	58·5	38·1	105·6	45·8	45·6	99	6	·03	S.
5	·66	50·4	39·2	80·4	49·3	48·1	92	10	·09	S.
6	·68	55·3	38·3	114·1	47·8	45·9	86	2	·49	S.
7	·71	55·2	39·8	103·5	46·2	44·9	92	1	·01	N.W.
8	·66	55·4	36·2	82·8	47·6	47·0	96	10	·12	N.W.
9	29·32	53·6	38·3	104·0	44·9	43·7	91	1	·50	N.W.
10	28·88	50·6	43·2	100·1	44·1	44·1	100	10	·09	N.W.
11	29·47	47·9	42·3	85·1	43·9	42·8	92	9		N.W.
12	·52	49·2	30·7	89·9	37·5	37·1	96			N.W.
13	·80	47·0	36·9	82·7	41·7	37·4	70	7	·03	N.W.
14	29·76	47·3	40·2	69·9	41·0	40·5	97	10	·21	N.W.
15	30·04	53·5	40·4	111·4	47·4	47·0	97	7	·25	E.
16	29·92	57·2	46·2	100·9	52·1	51·5	96	6		E.
17	30.13	56·1	34·6	91·7	39·5	39·5	100	10		N.E.
18	·09	53·9	37·2	91·4	43·1	43·1	100	8		N.W.
19	30·05	49·5	40·3	98·2	43·7	41·6	85	2		N.E.
20	29·92	46·8	37·2	75·8	40·9	37·9	76	10		N.
21	·77	51·3	38·2	85·6	41·6	39·2	81	9	·15	E.
22	·49	47·8	39·5	69·3	41·4	41·0	97	9	·01	N E.
23	29·45	48·4	39·6	58·7	43·4	42·7	95	10	·56	N.
24	30·19	44·7	42·1	78·7	43·7	42·7	92	10	·01	N.W.
25	29·61	51·6	32·5	99·1	38·8	37·1	86		·20	N.W.
26	·11	57·1	32·7		51·8	51·6	99	10	·01	S.W.
27	·26	49·8	43·9	107·8	46·0	42·7	78	5		N.W.
28	·48	47·5	36·5	91·1	41·7	38·8	77	3	·04	S.W.
29	·72	48·8	38·9	89·3	42·8	40·2	80	4		N.W.
30	·93	44·4	30·0	54·9	36·9	35·8	91	9	·50	N E.
31	29·44	45·6	36·2	73·5	44·5	44·5	100	10	·18	N.
Mean	29·68	51·5	38·8	90·7	44·6	43·3	90	6·5	Total 3·59	

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	29·81	47·8	39·1	91·4	42·7	40·5	83	6	·01	N.W.
2	30·06	52·4	35·2	75·0	41·9	41·6	98	7	·27	N.E.
3	30·00	51·5	41·1	56·9	48·4	48·1	97	10	·29	N.E.
4	29·77	51·6	47·6	55·8	51·6	51·4	99	10	·11	N.E.
5	29·60	47·7	37·0	85·0	42·8	41·9	92	9	·05	E.
6	30·11	50·6	29·2	88·1	36·8	36·0	93	8		N.E.
7	·25	49·9	35·5	79·2	44·2	42·9	91	9		E.
8	·29	44·8	26·7	54·0	33·8	33·6	98	10	·01	W.
9	·23	43·9	32·7	41·3	43·0	42·4	95	10	·03	N.
10	·22	44·4	41·0	46·4	43·0	42·9	98	10	·01	N.
11	·21	42·2	39·7	46·7	40·9	40·6	97	10		N.
12	30·15	42·3	40·4	46·4	41·3	40·6	95	10		S.E.
13	29·98	48·3	40·1	54·7	41·9	41·8	98	10		E.
14	·69	46.2	40·9	52·9	44·9	44·4	97	10	·12	S.W.
15	29·99	41·8	30·2	81·2	38·7	37·5	98	1		N.
16	30·30	42·3	27·5	85·4	33·7	32·8	89	2	·01	E.
17	30·22	10·6	26·1		32·9	30·5	71	2		N.E.
18	29·89	38·9	28·1	67·9	30·9	29·5	77	2		N.E.
19	·86	44·3	29·6	58·1	38·9	37·6	89	10		N.E.
20	·84	45·8	37·7	71·4	42·0	39·9	84	9		N.E.
21	·60	44·1	29·6	65·0	35·6	34·8	93	4		N.E.
22	·42	45·1	34·3	53·8	40·6	40·5	98	10	·01	N.E.
23	·43	41·3	37·2	56·3	38·9	38·4	96	10	·28	N.E.
24	·41	44·5	33·1	45·5	38·9	38·9	100	10	·23	N.E.
25	·32	47·3	37·8	53·9	42·4	42·4	100	10	·21	N.E.
26	·36	52·6	41·2	73·2	45·9	45·9	100	10	·56	N.E.
27	29·43	52·3	45·1	81·5	47·9	44·9	79	2	·32	S.W.
28	30·23	56·4	46·8		52·6	52·2	97	10	·27	S.W.
29	29·59	57·0	37·2	62·1	44·4	44·4	100	10	·23	S.E.
30	29·66	58·1	43·4	74·5	56·8	55·2	89	8	·26	S.W.
Mean	29·86	47·2	36·3	64·7	41·9	41·1	93	8·0	Total 3·28	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·10	47·9	37·3	79·8	40·2	39·9	98	1	·01	E.
2	·24	47·9	30·4	82·2	35·0	34·8	98	10	·01	S.E.
3	30·00	49·5	33·7		44·7	43·9	94	6	·10	S.
4	29·58	47·3	43·6	80·0	47·1	46·0	93	9		S.E.
5	·74	41·2	34·4	47·2	37·1	37·0	98	9	·34	S.
6	·43	39·4	34·4	48·3	35·5	35·3	98	7	·07	N.E.
7	29·73	38·3	33·3	49·3	34·7	34·5	98	10		N.E.
8	30·00	38·3	26·6		27·9			1		N.E.
9	·33	35·2	22·0	68·0	25·4			1		W.
10	·27	33·0	24·3	67·4	27·9			8		N.W.
11	·44	33·9	18·5	59·5	21·9			2		
12	·31	40·4	20·9	47·1	34·0			10	·01	S.
13	·22	42·9	32·9	47·7	40·7			10	·03	S.E.
14	·32	45·0	39·4	53·5	42·4			10	·01	
15	·38	50·8	38·8	77·6	42·0			7	·01	E.
16	·41	45·9	32·3	72·1	37·1			2	·01	S.E.
17	·41	47·9	36·3	52·3	45·9			10	·03	W.
18	·41	45·3	44·0	47·8	44·9			10		N.E.
19	·22	40·9	36·0	41·3	37·1			10		E.
20	·06	45·8	36·0	47·6	41·0			10		S.
21	·05	46·8	39·9	51·7	43·9			10	·08	S.
22	·16	45·8	39·9	56·0	40·9			10	trace	N.W.
23	·53	38·6	27·5	73·7	29·9			2		N.
24	·44	36·1	23·4	55·0	28·7	28·4	93	5		N.W.
25	·37	39·0	22·7	39·8	32·8	31·7	85	10	·01	S.
26	·32	40·6	31·6	44·0	37·9	37·6	97	10	trace	S.W.
27	30·49	42·3	26·5	64·2	30·3	30·0	95	6	·01	S.
28	29·99	48·6	29·2	60·3	42·3	41·5	94	10	·16	S.
29	29·89	38·8	32·0	72·1	33·9	31·8	78	9	·01	S.W.
30	30·11	45·8	26·8	70·6	29·1	27·8	79	3	·23	W.
31	29·87	48·1	27·9	56·3	45·6	43·6	86	10	·03	W.
Mean	30·16	42·8	31·7	59·0	36·7	36·3	92	7·4	Total 1·16	

Total rainfall for the year 26·82 in.

J. R. BARKWORTH, *Meteorological Album Keeper.*

ENTOMOLOGICAL REPORT.

More than usual has been done during the past year in this department, most of the common sorts having been recorded at rather early. The revival of interest in this branch of our Natural History is especially pleasing as the advance made in the two preceding years was very small. This year the list of the Diurni has been increased by the addition of Clifton Blue. Among the Nocturni, the ordinary Sphingidœ have all been taken, including the Convolvulus Hawk. The following may be added to the Geometers, and Noctuæ:

GEOMETRÆ:

Hemerophila Abruptaria (Waved Umber)	May 4..J.L.B.
Numeria pulveraria (Barred Umber)	May 21..H.B.W.
Oporabia dilutata (November Moth)	Oct. 25..H.B.W.
Larentia Salicata (Striped Turnspit)	June 13..H.B.W.
Thera Firminata (Pine Carpet)	May H.B.W.
Cidaria Testata (Chevron)	July 7..E.R.

CUSPIDATES:

Notodonta dictoeoidis (Lesser Swallow Prominent) July 16..J.L.B.

NOCTUÆ:

Acronycta Aceris (Sycamore)	June 13..H.B.W.
Xylophasia Rurea (Clouded Bordered Bundle)	June 13..H.B.W.
Miana Literosa (Rosy Minor)	June 29..J.L.B.
Cerastia Vaccinii (Chesnut)	Oct. ..H.B.W.
,, *Spadicea* (Dark Chesnut)	Oct. ..H.B.W.
Scopelosoma Satellitia (Satellite)	Oct. ..H.B.W.
Lucipara Euplexia (Small Angle-Shades)	July 5..H.A.B.
Xylina Rhizolitha (Pale Shoulder Knot)	Oct. 22..H.A.B.
Toeniocampa Stabilio (Common Quaker)	May ..J.L.B.
Heliothis Peltiger (Bordered Straw)	June 16..J.L.B.
Plusia Pulchria (Beautiful Golding)	May 28..H.B.W.
Noemia Typica (Gothic)	July 11..J.L.B.
Hydrocampa rivularia (Beautiful china mark)	July 5..J.L.B.

H.A.B.	Rev. H. A. Bull.
J.L.B.	J. L. Bevir, Esq.
H.B.W.	H. B. Wilkinson.
E.R.	E. Richards.

The collections shown up for the prize were much above the average.

J. S. MARRINER,

Entomological Album Keeper.

SEVENTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1886.

"Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης."

Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

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Ἐπιστολὴ πρὸς Ῥωμαίους, *I.* 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1887.

Contents.

RULES.

1. That this Society be called the "Wellington College Natural Science Society.

2. That the Society consist of Honorary Members, Corresponding Members, Members and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Associates elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fornight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers to be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

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PRESIDENT—S. A. SAUNDER, ESQ.

VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD.

SECRETARY { V. L. JOHNSTONE, R. O. CREWE-READ

TREASURER { R. S. HEYWOOD, J. C. V. DURELL

ALBUM KEEPERS.

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GEOLOGICAL—F. S. GOLDINGHAM.
ZOOLOGICAL—S. S. FLOWER.
BOTANICAL { R. O. CREWE-READ, P. B. NORRIS.
METEOROLOGICAL { J. R. BARKWORTH, J. C. V. DURELL.
ENTOMOLOGICAL—J. S. MARRINER.

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C. A. LANE
Hon. H. D. O. G. GIBSON
H. G. ARCHER†
C. WALTER
R. O. CAMPBELL
J. F. C. MARGESSON
E. C. MARGESSON
E. C. MORDAUNT

* Left Lent Term, 1886. † Left Easter Term, 1886. ‡ Left Michaelmas Term, 1886.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College N.H.S.

Cheltenham College N.H.S.

*Marlborough College N.H.S.

Clifton College N.H.S.

*Rugby School N.H.S.

*Dulwich College N.H.S.

*Haileybury College N.H.S.

*King Edward's School, Birmigham, N.H.S.

*East Kent N.H.S.

British Museum (Natural History)

*U. S. Geological Survey Office.

Linnean Society.

Royal Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	23	1	2
Subscriptions:			
Lent Term—Honorary Members ...	1	10	0
,, ,, Members and Associates...	4	14	6
Easter Term—Honorary Members ...	1	10	0
,, ,, Members and Associates	4	13	0
Michaelmas Term—Honorary Members	1	7	0
,, Members and Associates	8	16	0
Sale of Report	7	17	0
	£48	8	8

Examined and found correct, S. A. SAUNDER.
Dec. 21, 1886.

Expenditure.

	£	s.	d.
Becker, for Acid, Porus Cells &c. ...	2	16	0
Harvey and Peak, for Lime Cylinders ...		4	0
Spear, for Barometer case	1	12	6
Apps, for hire of Electrical apparatus ...	1	2	2
New keys for padlock		1	9
Blank charts for Meteorological observations ...		2	9
Perkins and Glasse, for reading thermometers &c. during holidays ...		17	0
Ifould, for charging battery, amalgamating &c. ...		8	0
Stamps		9	0
Carriage of Parcels			9
Bishop, for printing Report, &c. ...	11	10	5
Balance in hand	29	9	4
	£48	8	8

J. C. V. DURELL, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, March 13th.

H. M. Elder, Esq. gave a lecture on "Coal Gas."

Coal gas is obtained by the dry distillation of coal. The coal is placed in large clay or iron retorts which are heated by a furnace underneath. From these the gas is led by pipes to the "hydraulic main," a trough with which all the retorts are connected by water joints so that when one is opened, the gas from the others cannot pass back into it and cause an explosion. Here tar and ammonia liquor are deposited. From this the gas passes through a series of upright tubes or "condensers" and deposits more ammonia liquor, and then to the "scrubbers," towers filled with coke, in which it is washed by a stream of water. From the scrubbers it is driven by fans to the "lime purifiers," in which it is made to give up its sulphur impurities to the half slacked lime. It is then considered pure and passes through the "Station meter," which registers the quantity, to the large gas holders from which it is distributed to the consumers.

Gas owes its illuminating power to the presence of gaseous compounds of carbon in it. These being momentarily split up, free carbon is liberated at the high temperature of the flame, and this glowing brightly before it is consumed supplies the light. Coal gas is also useful for other purposes besides illumination, many engines are driven by it and it is generally used to fill balloons.

Perhaps more important than the gas itself are the by-products which are formed in its manufacture. First of these comes coke, that is the remainder of the coal in the retorts after all the gas has been driven off. Then the tar which may be used in its crude state as tar, or fractionally distilled and made to yield a series of products, naptha, heavy oil, benzine, anilin and many others, leaving a non-volatile residue, pitch, behind. Then the ammonia liquor from which most of the sulphate of ammonia largely used as manure is drawn, and which also contains anilin and other useful products. Lastly the impure lime itself is used as manure for some soils.

The most interesting of all the by-products obtained as above is anilin which is the base of all the celebrated coal tar or

anilin dyes and also of many flavouring matters which are used in the manufacture of sweets. This comes off with carbolic acid or phenol, a closely allied compound, and thanks to the researches of Dr. Perkin a series of dye-stuffs has been obtained from these, which have almost entirely taken the place of the vegetable dyes before used, and have consequently enormously cheapeaned the production of coloured fabrics.

Mr. Elder illustrated his lecture by a number of interesting experiments, including a working model of the works, borrowed from the College Gas Works for the occasion. The colours of many of the aniline dyes which he shewed us were extremely beautiful.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, April 3rd.

The Rev. A. R. Sharpe gave a lecture on "Optics."

The lecturer began by showing that in doing optical work lenses and mirrors were needed to isolate the rays of light. A piece of tinfoil was placed between the screen and the lime-light, and when a small hole was pricked in the tinfoil, an image of the candle was thrown on the screen; as more holes were made, more images of the candle appeared until at last the images overlapped showing that the white glare which appeared on the screen when the tinfoil was entirely gone consisted of numerous images of the candle. After this the working of the lecturer's pulse was shewn on the ceiling by means of a beam of light from the lantern reflected on the ceiling from a small mirror fastened by wax to his hand. Then followed the Luminous Cascade intended to illustrate the subject of total internal reflection, the interest in this experiment being greatly increased by the knowledge that it involved the possibility of a shower bath to all the spectators in its neighbourhood. A rainbow was then shown on the screen by the aid of a glass bulb full of water: this experiment was extremely successful as the secondary rainbow which is occasionally seen in the sky was clearly visible. After some soap bubbles had been twisted into various forms to show their toughness, an image of a soap film was thrown on the screen and exhibited the most remarkable and beautiful changes of colour. Bands of colour passed slowly up the image unless the film was disturbed by draughts of air when the bands assumed most strange and weird shapes.

Votes of thanks to the lecturer and to Mr. Elder who had kindly assisted in performing the experiments were proposed by Mr. Caulfeild.

Saturday, May 29th.

E. A. Upcott, Esq. gave a lecture on "Rome and Pompeii."

The lecturer began by disclaiming any intention of delivering an archaeological discussion on Roman antiquities; his object being merely to show and explain some photographs of a few of the most interesting remains.

The first exhibited was a view of the Capitol. The appearance of this hill, as of others, has been entirely altered by the modern buildings erected upon it, so that when approached from the west it presents no trace of antiquity, though on its eastern side the lower parts of the Tabularium still remain.

Passing by the road to the right, we obtain a view of the Forum Romanum stretching in an easterly direction from the Capitoline hill. A photograph of this was shown and explained at some length. The Forum was the centre of Roman life in Republican times, during which it was crowded with public buildings and monuments. Many of these were restored or rebuilt by the earlier emperors, though the pressure on the space was relieved by the establishment of new Fora elsewhere. The period of destruction began about the seventh century, and the materials of the buildings were largely used for the erection of churches and castles on the site, till the place became eventually a heap of rubbish with a few columns protuding here and there. In still later times it was known as the Campo Vaccino, and the work of regular excavation was not undertaken till comparatively late in the present century. This has disclosed the Via Sacra, a small portion of the Republican paving of which still exists, and many traces of the buildings by which the ground was originally occupied.

A view of the Forum from the other end was then shown, and a relief of the time of Trajan representing the sacrifice of a bull, a sheep, and a pig (suovetaurilia), discovered in the foundation of a tower in 1872.

Photographs of two triumphal arches came next; those of Titus and Constantine. The former was erected after the taking of Jerusalem, and shows on a relief on the inside of the arch the golden candlesticks and spoils from the Temple carried in triumph. The latter is sometimes called the arch of Trajan, because its builders decorated it with reliefs taken from an arch of Trajan already existing.

Views of three monumental tombs followed, that of Caius Cestius, afterwards built into Aurelian's Wall; of Cæcilia Metella on the Via Appia; and the Mausoleum of Hadrian on the other side of the Tiber. The latter became in later times the Castle of St. Angelo, so called from the dedication of a chapel there by Gregory the Great to "the Archangel Michael." It was used

as a fortress by the Popes, with whose palace on the Vatican it was connected by a passage.

A photograph of the Coliseum was next shown. Built by the emperors Vespasian and Titus as a gladiatorial circus, it is the most widely known and on the whole the best preserved of all the ruins of ancient Rome. In the latter respect it contrasts strongly with the remains of the Imperial palaces on the Palatine, a contrast drawn out by Byron's lines in Manfred.

A general view from the Pincian Hill concluded the Roman photographs.

Passing to the second part of the subject, a general view of the Bay of Naples was first shown. Pompeii, buried by the eruption of Vesuvius in 79, A.D., was not discovered till 1748, nor systematically excavated till comparatively recent times. About one third of the town has now been laid bare. It was destroyed by fire as well as buried, so that the ruins of the houses only remain, the upper story having survived in one or two cases only.

A general view of the town was first exhibited; next one of the so called Street of Fortune, showing the ancient paving and stepping stones; these were followed by views of the Forum, the Street of the Tombs, outside the gates, and the Theatre. A photograph of the House of the Tragic Poet (also called the House of Glaucus from Bulwer Lytton's novel) served to illustrate the arrangement of an ancient Roman dwelling-place.

Nearly all objects of interest found at Pompeii have been removed, some to a museum adjoining the town, but the greater part to the National Museum at Naples. Among the most interesting of these are the wall paintings and mosaics, many of which were found in an excellent state of preservation. The two chosen for illustration were a full length figure of Medea meditating the murder of her children, and a group representing the sacrifice of Iphigenia at Aulis.

The oxy-hydrogen lantern was used to show the photographs; the slides for it having been most kindly prepared by Mr. Elder for the purpose.

A vote of thanks to the lecturer was proposed by the Master.

Saturday, June 12th.

H. M. Elder, Esq. gave a lecture on "Coal Tar Colours."

When coal is distilled in the manufacture of gas many other products are formed. These depend to some extent on the way in which the coal is distilled and still more on the kind of coal used. Thus if a bituminous coal be used, large quantities of the so-called mineral oils are obtained, especially if the coal is distilled at a low temperature, but if an anthracite coal be used

and distilled at a high temperature, various more complicated products pass over, and these are the bodies from which the so-called anilin dyes are obtained.

The products of the distillation of coal appear in four classes, viz., the gas, the ammonia liquor, the tar, and the coke left in the retort. It is with the tar that we have to do. This is redistilled and the parts that pass over at different temperatures collected separately. The most important of these is Benzine. Benzine was discovered by Faraday in 1825 and is used in its crude state for many purposes at the present day. It is however chiefly important to us as the foundation of the many hundreds of different colouring matters, flavouring essences and scents that may be produced indirectly from it. Thus by acting on it by nitric acid a body called nitro-benzene is formed which is sometimes sold under the name of "artificial oil of bitter almonds," and is largely used for scenting shaving soap and for making the well known heliotrope scent.

From benzine is produced a body called anilin and it was from this that Perkins produced the first of the coal tar or anilin colours, viz. mauve, in 1856. Since then many other colours have been produced from it, the simplest of which is the anilin red or magenta. This is the acetate or chloride of a base called rosanilin, and all the other colours of this class such as Hoffman's violet, Malachite green and soluble blue are like it. The bases from which they are formed are generally white, and consequently these may be painted on paper and remain invisible till brushed over with some dilute acetic acid when the colours at once appear. Another class of colours is obtained from phenol or carbolic acid which is itself a derivative of benzine. Many of these are interesting on account of their intense fluorescence. Yet another most interesting class of colouring matters is obtained from anthracene, a constituent of coal tar that distills over at a much higher temperature than benzine. The colouring matter obtained from this is called "Alizarin" or "Artificial Madder" and is identical with that obtained from madder root. The consequence of this is that the cultivation of madder has almost died out. This is a most important dye as it is largely used for printing cottons. The process is known as "adjective dyeing," that is to say the cotton is first printed with some metallic salt, acetate of alumina or acetate of iron, as a mordant, and then thrown into the boiling dye bath. Those portions that the mordant has touched are dyed the remainder being unaffected.

These colouring matters are far from being the only useful bodies that are obtained from coal tar. Lately, at least three very important febrifuges have been obtained from it, the most powerful of which, antipyrin, is said to act better than quinine.

It is said also that quinine itself has been produced at a cost of threepence per ounce. Many of our jams depend on coal tar both for their colour and flavour. Mr. Rimmel says that many of his favourite scents are produced from the same substance, and lastly a body has been produced and named saccharine which is said to possess no less than two hundred and twenty times the sweetening power of sugar, and not only that but to be perfectly harmless to people who suffer from diseases that make sugar almost poisonous to them.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, July 3rd.

V. Awdry, Esq. gave a lecture on "Bells."

Bells were probably first used as means for summoning people to religious service by the Christian Church, and it is said that large bells were introduced by Paulius of Nola in Campagna about A.D. 400—hence is derived the name Campanology. They were first cast in England in the reign of Edmund I by Turkeytel, the then Chancellor; his successor by casting them of different sizes succeeded in obtaining a fairly tuneable set of six which were hung in Croyland Abbey in A.D. 960.

During the seventeenth and eighteenth centuries, bell ringing seems to have been much appreciated and we hear of several societies or guilds of bell ringers who did good work. In the early part of the present century, bell ringers, in many cases most unjustly, seem to have obtained a bad name, and it is only within the last few years that their art has again found anything like general favour.

Bell metal is composed of copper and tin, the best being obtained by the fusion of three parts of copper with one of tin. It is a common mistake to suppose that silver improves the tone, the effect of any perceptible quantity of the metal would be exactly the reverse.

The proportions of the bell are of great importance. Taking as our unit the thickness of the "sound bow," (the place where the clapper strikes and the thickest part of the bell), the diameter at the mouth should be fifteen times that thickness, the height from the mouth to the shoulder twelve times, the diameter at the shoulder seven and a half times, or just half the diameter at the mouth. When the bell is to be cast a pit of sufficient width and depth is dug and the "crook" is made. This is nothing but a pair of compasses, the fixed leg consisting of an upright pivot

driven firmly into the ground in the centre of the pit and the movable legs, of which there are two, of pieces of wood cut respectively to the shape of the inside and of the outside of the bell. Round the pivot a hollow arc of brickwork is built rather smaller than the inside of the proposed bell. This is coated with clay which by a few turns of the inner leg of the crook, is moulded to the shape of the inside of the bell. A fire is lighted under the brickwork and the clay baked. When cool it is rubbed over with a composition of grease and tan to prevent the next coating of clay, which is then put on, from adhering to the first. The outside leg of the crook is then fixed on the pivot and the clay moulded to the form of the outside of the bell, the inscription, if there is to be one, is traced, a clay model of the crown of the bell fitted on and the whole baked hard. This is then greased as before and a last coating of clay, called the cope, baked on. The cope is lifted off, the coating of clay next to it, which is a model of the bell and has been prevented from adhering by the now melted grease, is taken away, the cope replaced and the mould is ready to receive the metal.

After casting, the bell has to be tuned. If too sharp, the thickness of the bell is reduced evenly all round by a revolving chisel, if two flat, a little of the lip is turned away and the diameter reduced.

When hung, the bell is firmly attached to a wooden wheel the diameter of which, is about twice the height of the bell, this wheel has a groved tyre round which the rope passes, one end passing through the sole of the wheel and being attached to a spoke, the other passing through the floor of the belfry. On pulling the rope, the wheel turns and the bell begins to swing. There are two ways in which a bell thus hung made be made to speak, which are called respectively chiming and ringing. In chiming the bell is only allowed to swing some eighteen inches or two feet and speaks with the mouth downwards, whereas in ringing it is turned right over, describing rather more than a complete circle each time the rope is pulled and speaks with the mouth upwards. There is an arrangement by which the bell is stopped at the end of each swing and kept in position, mouth upwards, until the rope is again pulled. One great advantage of ringing over chiming is that in the former when the bell has sounded each time, the clapper lies against the bell and acts as a damper effectually checking the vibrations, so that the sound of each bell is heard separately and distinctly, whereas in the latter, the clapper hangs freely, the bell continues to sound long after it has been struck and the result is often a discordant hum in which the notes of all the bells may be heard at the same time.

The lecturer concluded by giving examples of some of the

rules for change ringing, explaining the systems on which the changes are produced.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, July 17th.

A Conversazione was held at Mr. Saunder's house.

Saturday, July 24th.

S. S. Flower read the essay on "Reptiles," which won the Pender Prize.

The writer began by observing that as the Class of Reptiles contained some 4,000 existing species, it was necessary to limit himself in this paper to those true Reptiles now indigenous to the British Isles and to a few of the more interesting foreign species. The Reptilian Fauna of Great Britain is at present very poor, there being only six true British forms and three more whose captures are on record; all these are either snakes or lizards except the Leathery Turtle (*Spargis coriaceus*) and the Hawk's-bill Turtle (*Chelonia imbricata*) which have each been captured three or four times in British Seas. Of the remaining species the Common Lizard (*Lacerta vivipera*) was first described. This Lizard is both the commonest and the smallest of our British Reptiles, it is to be found more or less abundantly in every County of England, especially where there are heaths, and is also found though more scantily in Scotland and Ireland. It lives on insects, and is very fond of spiders. The great difference between this lizard and the other British species is that it is ovo-viviparous. A description and measurement of the lizard then followed. The next species is the Sand Lizard (*Lacerta agilis*). It is of a thicker build, larger, handsomer and less active than *L. vivipera*; it lays eggs in the sand to the number of twelve or fourteen. Measurements were then given, and detailed descriptions of several individuals. Some mention was then made of Foreign Lizards, more especially of the Sonoran Heloderm (*Heloderma suspectum*), the only poisonous lizard, and of the Chamœleon (*Chamæleon vulgaris*). A description was next given of the Green Lizard (*Lacerta viridis*) which some afirm to be a native of this country. The next species treated of was the slow-worm (*Anguis fragilis*), the first animal in which the unpaired parietal eye was observed. The paper now turned to the Snakes of which there are three British representatives, two being harmless, namely the Common

Ring or Grass Snake (*Tropidonotus natrix*), common throughout England and the largest British reptile, and the rare Smooth Snake (*Coronella lævis*), of which four specimens are known to have been observed in the neighbourhood of Wellington College. The third species being the Viper or Adder (*Vipera berus*), the only British reptile that is poisonous or in any way capable of hurting a human being. The writer concluded by mentioning that in June, 1886, a boy at Wellington was bitten by a young viper, but was all right again in a few days, and that another turtle had lately been seen in British Seas.

At the conclusion of the essay, Mr Carr complimented the writer on his powers of observation, which, coupled with a real love of his subject, had enabled him to produce so interesting, and at the same time really scientific a paper.

Saturday, October, 16th.

The PRESIDENT gave a lecture on "Tides."

The explanation of the cause of the tides was a problem which, before the time of Newton, presented such insuperable difficulties, that it became proverbially known as "the grave of human curiosity"; but when the principle of universal gravitation was enunciated, Newton appealed to their existence as one of the most powerful arguments in its favour, and shewed how they might be accounted for by the unequal attraction of the moon on different parts of the earth. The sun also raises tides which though not so high as those raised by the moon yet effect several important modifications in them. It is to the existence of these solar tides that the difference between spring and neap tides is due. When the sun and moon are pulling the waters in the same direction, as at new and full moon, we have a high or spring tide, but when the tide raising forces act in opposite directions as at first and third quarter we have low or neap tides.

The explanation of the actual phenomena presented by the tides is much complicated by the manner in which a disturbance once produced in a piece of water spreads to parts far removed from the direct action of the disturbing cause. Of the phenomena themselves a great deal may be learnt by drawing on a map lines —called cotidal lines—connecting all those places at which high water occurs at the same time, the lines being so drawn that the distances between them correspond to intervals of an hour in the times of high water. The tides appear to have their birth place in the great Southern Ocean and thence to spread northwards, although, as Sir George Airy has shewn, those in the Atlantic may be due to the direct action of the moon; around our own coasts they are certainly due to the spreading of the disturbance from the North Atlantic. We have thus two tidal waves

travelling one along the English Channel from West to East and another down the German Ocean from North to South. Many of the anomalies presented by the tides on our East coast are due to the meeting and interference of these two waves. When the tide reaches shallow water, especially in a bay with contracting sides, its height is generally raised, whilst as it proceeds up a river the front of the wave becomes steeper so that the time occupied by the tide in rising decreases and the time occupied in falling increases as the river is ascended. These facts help to explain the existence in some rivers of what is known as the "bore," where the tide rushes up almost like a wall of water. The best instance of this in England is to be found on the Severn.

The friction of the tides must be slowly reducing the Earth to rest, and thus increasing the length of the day. Some evidence that this is actually taking place may be obtained from a discussion of the eclipses recorded as having taken place some two thousand years ago. Calculations have been made which shew that the earth is now going about 11½ seconds a year slower than it was 2,500 years ago, but the numerical data are uncertain and too much reliance must not be placed on the exact amount.

Professor G. H. Darwin has, of late years, been investigating mathematically the manner in which the motions of two bodies, situated with regard to one another as the earth and moon are, would be affected by the tides generated in them. He finds that some long time ago, not less than fifty-four millions of years and possibly much longer, the earth and moon were almost in contact, the earth then revolving on its axis in somewhere between two and four hours and the moon always keeping above the same spot; he has also given us reasons for thinking that the moon had just before this been torn from the earth.

The moon then began to recede from us, whilst both the period of its revolution and that of the earth's rotation increased. Thus, the day and the lunar month have been, and still are, becoming longer though not at equal rates. At first they were of the same length, then the month contained two, three and at the greatest twenty-nine days, now it is only 27⅓ days long, the day is increasing the more rapidly and this will continue until the two are of the same length again, but each from forty to fifty of our present days. The moon will then raise only a stationary tide on the earth, but the tides raised by the sun will cause the day even then to increase still further.

Sir R. S. Ball has pointed out that when the older sedimentary rocks were formed the moon must have been nearer the earth and consequently the tides higher than at present. The decrease in the height of the tides since then may have been very considerable, and these high tides of past ages may enable us to

account for the great thickness of some of these rocks without requiring the enormous periods which Lyell and geologists of the uniformitarian school have demanded.

A vote of thanks to the lecturer was proposed by Mr. Goodchild

Saturday, October 30th.

Professor W. H. Flower, F.R.S., gave a lecture on "Horses of the past and present."

One of the first problems which presents itself to a naturalist with regard to any animal is to find out how it is connected with others which he knows. The horse, with its immediate allies, the donkey, zebra, and giraffe, is of such curiously modified structure and so isolated from all other animals at present existing upon the globe, that geologists used to place it in a order by itself, called *Solipedia* or *Monodactyla.* It is only by studying the records of the past that its real affinities can be discovered.

The latest of the three great Geological Periods called the Tertiary has been sub-divided into the Eocene, Miocene, Pliocene, Pleistocene and Recent periods occurring in the order here given. No animal at all allied to the horse has hitherto been found in any strata of a period older than the Tertiary; the earliest known, representative of the group to which it belongs, is one recently discovered in America called the Phenacodus. Only a few bones have been found and very little is known of it, but it was undoubtedly allied to many now existing animals. About the size of a fox, it had five toes on each of its four feet, the bones of which were very much like those of a man's hands and feet respectively. On each side of each jaw were 3 incisor teeth, 1 canine and 7 molars, making a total of altogether forty-four teeth. The Phenacodus lived in the early part of the Eocene period; in the later parts of the same period were many animals with three toes in each hind foot—those corresponding to the first finger (thumb) and fifth (little) finger having almost or entirely disappeared—and four toes on each fore foot, the thumb only being lost, but the median line in each case passing down the middle of the third finger. Many of these, such as the tapir, have continued almost unchanged to the present day. Another branch of the same family developed into the rhinoceros in which each of the four feet has lost the two outer toes, and the animal has grown one, sometimes two, horns on its nose.

About the middle of the Pliocene times many horse-like animals are found in which the neck has become elongated, the leg longer, the two bones of the lower leg have united into one and the foot has three toes with the middle one very much en-

larged, the other two small and hanging behind when the animal walks, like the dew claw of a dog. In the modern horse these two rudimentary toes have disappeared, and we have an animal standing on only one—the middle or third—toe.

These changes in structure were connected with changes in the mode of life, the earlier animals having feet suited for forests and swampy marshes, but as the ground dried and the forests gave way to open plains speed was required to enable the animal to escape from its enemies, and in the horse we have a structure almost perfectly contrived for obtaining great speed on a dry level plain.

The number of teeth has throughout remained almost the same, the modern horse having the 3 incisors and 1 canine, but as a rule only 6 molars, although occasionally in the upper and more rarely in the lower jaw, a small tooth is found just in front of these, the remnant of the seventh molar of the horse's early ancestors. The molar teeth have also become much harder in consequence of complicated folds in the enamel which thus penetrates the softer ivory or dentine of the interior, whilst their great length allows for a certain amount of grinding away which the increased hardness cannot entirely prevent. This peculiar structure, whether of tooth or foot, is never found in the early animals. In the upper surface of each of the incisors is a deep fold in the enamel causing a hole or pit in the crown of the tooth, as the tooth wears down the depth of the pit decreases and it finally disappears at different times in the different teeth, thus giving a very fair indication of the horse's age.

What we call the horse's knee really corresponds to our wrist, and his hoof to our nail, growing in just the same way but nearly all round and closing over the end of what corresponds to our finger.

The cloven hoof of a cow which appears at first sight to be like a horse's hoof divided down the middle is really totally distinct and has a history of its own. In the pig the thumb has disappeared, the animal has four fingers the two middle ones being enlarged and equal, and the median line running between what correspond to our third and fourth fingers—the thumb being as usual reckoned the first finger. In the deer the two outside toes have nearly disappeared, while the two bones below the wrist unite into one. In the ox these outer toes have altogether gone and the cloven hoof is thus the survival of the third and fourth fingers of the five fingered animal.

The language employed in the lecture almost of necessity presupposed the truth of the doctrine of evolution. When all the intermediate forms between apparently different structures are considered—and new links are being continually discovered—it becomes almost impossible to resist the inference of a gradual

change from one type to the other. This change, however, cannot be strictly demonstrated, and it is still open to any one to believe in the alternative hypothesis of a separate creation for each animal; but when all the evidence is considered this hypothesis becomes a very difficult one to maintain, whilst it cannot be in any way derogatory to the Creator to suppose his influence continually presiding over the progress of a development, the power of effecting which he must have originally implanted in his Creatures.

A vote of thanks to the lecturer was proposed by the Master.

Saturday, November 20th.

C. E. Williams, Esq., gave a lecture on "Maps."

The Lecture commenced with a description of some of the early unscientific ideas on cosmography, the earliest of all being that of a flat earth and solid vaulted sky, which is common to all primitive races. The stars were golden studs nailed into the vault, or were holes through which could be seen the fiery ether above—or, like Jack of the Beanstalk, people expected to find above the sky, if they could only reach it, another country and other inhabitants.

The problems of how the sky is supported, how the earth itself is supported, and what becomes of the sun when it sets, gave rise to many fanciful theories, among others that of the Vedic priests that the earth is supported on 12 pillars, which in turn are supported by the sacrifices paid to the gods—a good working theory from the priests' point of view. Again, the sky is supposed to rest on walls or mountains beyond the ocean that surrounds the habitable world, and the Sun is either believed, as in Homer, to be carried round the North in a vessel along the ocean-river from the place of its setting in the West round to the East again ready for the next day—or else to retire behind a huge mountain in which the earth, rising higher and higher, at last culminates up at the North.

Most of these old errors were repeated and supported in a curious work called the "Christian Topography," written in A.D. 535, by a monk named Cosmas with the object of confuting the unorthodox idea of the earth being a sphere, a view which had been proved true 800 years before and was gaining ground, though very slowly.

An outline of an 8th Century map of the world was thrown upon the screen and the Fac-simile, from the Library, of the Hereford "Mappa Mundi" was shewn upon the wall. This latter, made about A.D. 1300, is the finest example known of the Mediæval Maps in which the habitable world is represented as a circle with Jerusalem exactly in the centre and the Earthly Paradise at the extreme East. Asia does not extend beyond

India, nor Africa further South than the desert. These maps must be regarded rather as illustrated charts of legend and history than as serious attempts to represent the true shape and position of countries.

If we turn, however, to Italy we find towards the end of the 13th Century, if not earlier, that the invention of the Mariner's Compass had been followed by the construction of Loxodromic Charts of the Mediterranean. Lines are drawn all over the map to the 32 points of the compass, and the positions of places then marked down according to their true bearings and distances. These are the most useful maps for seamen, and the method of mapping invented by Mercator in 1569 leads by a different process to the same result. On such a map the course of a ship, sailing always towards the same point of the compass, is represented by a straight line. Perhaps the finest example of a Loxodromic Chart is the map of the world lent by the Pope to the Colonial and Indian Exhibition. It was made at Seville in 1529, and is a fuller and amended copy of the map that Pope Alexander Borgia caused to be made in 1494 and down which he ruled a meridian, all discoveries to the East of which were to belong to Portugal, those on the West to Spain.

The proof of the sphericity of the Earth, and the first attempts to calculate its size and to lay down the latitudes and longitudes of places were the work of the Greek Astronomers from Eudoxus to Ptolemy. The Earth being a sphere, all representations of it upon a flat surface must be distorted. The chief methods of map-making besides Mercator's are by Projection and Development.

The different methods of map-making were then illustrated by the Lecturer with diagrams and with the help of a skeleton cardboard hemisphere, which allowed the meridians and parallels to be thrown upon a screen by means of a lamp and shewed Gnomonic, Stereographic, and Globular projection.

The meridians being all attached to one parallel and then opened out, first into a cone and then into a plane, shewed Conical Development and when the parallels were all attached to one meridian and then opened out it explained Polyconic Development, a method which, for the map of a hemisphere, gives a result not very different from the plan of Stereograpic projection.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, December 4th.

H. G. Armstrong, Esq., gave a lecture on "The human skeleton with special reference to injuries to which it is liable."

A vote of thanks to the lecturer was proposed by Mr. Williams.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Wednesday, February 3rd.

At a P.B.M., C. B. Bonham, J. N. Wright, G. O. Speedy, N. M. Hemming, J. C. V. Durell, G. Le S. Amphlett, W. M. Harrison, P. L. Brownell, F. H. Browning, F. S. Goldingham, C. G. Currie, J. T. R. Ridgway, G. S. Pownall, were elected Associates.

J. R. Barkworth resigned the Meteorological Album and a vote of thanks was carried.

J. C. V. Durell was elected to fill the vacant post.

J. W. Weigall and G. V. Davidson were elected to serve on the Committee for the term.

Saturday, February 27.

At a P.B.M., L. T. Hawksley, A. F. Ruxton, G. B. Scott were elected Associates.

S. S. Flower was elected Zoological Album Keeper.

At a Committee meeting, G. B. Drew, W. A. Margesson, J. W. Williams, P. B. Norris were elected Members.

S. S. Flower and J. C. V. Durell were elected additional Members under rule 32.

Friday, May 21st.

At a P.B.M., A. H. Wilkinson, Hon. H. D. O. G. Gibson, C. Walter, R. O. Campbell, B. M. N. Perkins, J. F. C. Margesson, C. A. Lane, H. G. Archer were elected Associates.

J. W. Weigall, A. B. Ward were elected to serve on the Committee for the term.

At a Committee Meeting, J. S. Marriner, J. R. Barkworth, were elected Judges for the Pender Prize.

Saturday, July 24th.

V. L. Johnstone resigned the office of Secretary, a vote of thanks was passed.

R. S. Heywood resigned the office of Treasurer, a vote of thanks was passed.

J. R. Barkworth resigned the office of Ethnological Album Keeper, a vote of thanks was passed.

J. C. V. Durell resigned the office of Meteorological Album Keeper, a vote of thanks was passed.

R. O. Crewe Read resigned the offices of Botanical Album Keeper and Geological Album Keeper, a vote of thanks was passed.

J. S. Marriner resigned the office of Entomological Album Keeper, and a vote of thanks was passed.

S. S. Flower resigned the office of Zoological Album Keeper, and a vote of thanks was passed.

R. O. Crewe Read was then elected Secretary.

J. C. V. Durell was elected Treasurer.

J. R. Barkworth was re-elected Ethnoological Album Keeper.

J. C. V. Durell was re-elected Meteorological Album Keeper.

P. B. Norris was elected Botanical Album Keeper.

F. S. Godingham was elected Geological Album Keeper.

S. S. Flower was elected Entomological Album Keeper and Zoological Album Keeper.

Thursday, September 30th.

At a P.B.M., J. P. Reid, E. C. Margesson, and E. C. Mordaunt were elected Associates.

V. L. Johnstone, J. W. Williams were elected to serve on the Committee for the term.

S. S. Flower resigned the Entomological Album and P. B. Norris was elected into his place.

At a Committee Meeting, P. B. Norris, A. Grant Duff, H. B. Wilkinson, J. R. de M. Abbott were elected Members.

EXCURSIONS.

On Saturday, June 5th, by the invitation of Professor Flower, F.R.S., the President with nine members of the Society paid a visit to the British Museum Natural History collections at South Kensington. Professor Flower himself most kindly conducted us over the building, explaining the general plan of the arrangement and pointing out and describing to us many of the most interesting specimens. We were also taken into a part of the Museum set aside for British animals and insects which had not at the time not been opened to the Public. Under Professor Flower's guidance not only was the visit itself rendered highly instructive but many of us carried away ideas which will render future visits doubly interesting. After being most hospitably entertained at luncheon by Mrs. Flower we proceeded in the afternoon to the Indian and Colonial Exhibition where some of us were in the absence of Sir Samuel Davenport but at his request most kindly conducted through the South Australian Court by Mr. Scott, whose explanations of the various exhibits, coupled with a practical demonstration of the excellence of the Australian wines and fruits greatly increased the pleasure derived from the visit.

PRIZES.

A prize of the value of £5 is given annually by Mrs. Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition :

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That preference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but

should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1886 was awarded to S. S. Flower for an essay on "Reptiles."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The prizes for 1886 were divided between O. D. Blunt and R. Sparrow, proxime accesserunt L. F. S. Hore and H. B. de V. Wilkinson.

PHENOLOGICAL REPORT.

During the early months of the year the following observations were made of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list.

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &C.)

1	**Anemone nemorosa** (Wood Anemone)	
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)	Mar. 19
3	*Ranunculis acris* (Upright Crowfoot)	
4	**Caltha palustris** (Marsh Marigold)	
5	*Papaver Rhœas* (Red Poppy)	
6	*Nasturtium officinale* (Water Cress)	
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)	
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)	
9	*Draba Verna* (Whitlow Grass)	Mar. 23
10	*Viola odorata* (Sweet Violet)	Mar. 27
11	*Polygala vulgaris* (Milkwort)	
12	*Lychnis Flos-cuculi* (Ragged Robin)	
13	*Stellaria Holostea* (Greater Stitchwort)	
14	**Malva sylvestris** (Common Mallow)	
15	*Hypericum tetrapterum* (Square St. John's Wort)	
16	,, *pulchrum* (Upright St. John's Wort)	
17	**Geranium Robertianum** (Herb Robert)	
18	*Euonymus europœus* (Spindle-tree)	
19	*Acer Pseudo-platanus* (Sycamore)	
20	*Æsculus Hippocastanum* (Horse Chesnut)	
21	*Cytisus Laburnum* (Laburnum)	
22	**Trifolium repens** (Dutch Clover)	
23	*Lotus corniculatus* (Bird's Foot Trefoil)	
24	*Vicia Cracca* (Tufted Vetch)	
25	,, *sepium* (Bush Vetch)	
26	*Lathyrus pratensis* (Meadow Vetchling)	
27	**Prunus spinosa** (Sloe, or Black-thorn)	
28	*Spirœa Ulmaria* (Meadow-Sweet)	
29	*Potentilla anserina* (Silver-weed)	
30	*Rosa canina* (Dog Rose)	
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)	
32	*Cratægus Oxyacantha* (Hawthorn)	
33	*Epilobium hirsutum* (Great Hairy Willow-herb)	
34	,, *montanum* (Broad Willow-herb)	
35	*Angelica sylvestris* (Wild Angelica)	
36	*Daucus Carota* (Wild Carrot)	
37	**Hedera Helix** (Ivy)	
38	*Cornus sanguinea* (Dog-wood)	
39	*Syringa vulgaris* (Lilac)	
40	*Galium Aparine* (Cleavers)	
41	,, *verum* (Yellow Bedstraw)	
42	*Dipsacus sylvestris* (Wild Teasel)	

43 *Scabiosa succisa* (Devil's-bit)
44 *Petasites vulgaris* (Butter-bur)
45 **Tussilago Farfara** (Coltsfoot) Mar. 18
46 **Achillea Millefolium** (Milfoil, or Yarrow)
47 *Chrysanthemum Leucanthemum* (Ox-eye)
48 *Artemisia vulgaris* (Mugwort)
49 *Senecio Jacobæa* (Ragwort)
50 **Centaurea nigra** (Black Knap-weed)
51 *Carduus lanceolatus* (Spear Thistle)
52 ,, *arvensis* (Field Thistle)
53 *Sonchus arvensis* (Corn Sow Thistle)
54 *Hieracium Pilosella* (Mouse-ear or Hawk-weed)
55 **Campanula rotundifolia** (Hair-bell)
56 *Ligustrum vulgare* (Privet)
57 **Convolvulus sepium** (Greater Bind-weed)
58 *Symphytum officinale* (Comfrey)
59 *Pedicularis sylvatica* (Red Rattle)
60 *Veronica Chamædrys* (Germander Speedwell)
61 *Mentha aquatica* (Water Mint)
62 *Thymus Serpyllum* (Wild Thyme)
63 *Prunella vulgaris* (Self-heal)
64 *Nepeta Glechoma* (Ground Ivy)
65 *Galeopsis Tetrahit* (Hemp-nettle)
66 *Stachys sylvatica* (Hedge Woundwort)
67 *Ajuga reptans* (Bugle)
68 **Primula veris** (Cowslip)
69 *Plantago lanceolata* (Ribwort Plantain)
70 *Mercurialis perennis* (Dog's Mercury) male Mar. 24, female Mar. 31
71 *Ulmus montana* (Wych Elm)
72 *Salix Caprea* (Great Sallow) Mar. 19
73 *Fagus sylvatica* (Beech)
74 *Corylus Avellana* (Hazel) Mar. 8
75 *Orchis maculata* (Spotted Orchis)
76 *Iris Pseud-acorus* (Yellow Iris)
77 *Narcissus Pseudo-narcissus* (Daffodil) Mar. 22
78 *Galanthus nivalis* (Snowdrop)
79 **Scilla nutans** (Blue-bell)

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY).

80 *Melolontha vulgaris* (Cock Chafer, or May Bug)
81 *Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)
82 *Timarcha lævigata* (Bloody-nose Beetle)
83 *Lampyris noctiluca* (Glow-worm)
84 *Apis mellifica* (Honey Bee, or Common Hive Bee)
85 *Vespa vulgaris* (Wasp)
86 *Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)
87 ,, *Rapæ* (Small Garden White or Cabbage Butterfly)
88 *Anthocharis Cardamines* (Orange-tip Butterfly)
89 *Epinephile Janira* (Meadow-brown Butterfly)
90 *Bibio Marci* (St. Mark's Fly)

BIRDS.

(ARRIVAL ; SONG ; NESTING ; FIRST EGG.)

91	*Strix aluco* (Brown Owl)	
92	*Muscicapa grisola* (Flycatcher)	May 26
93	*Turdus musicus* (Song Thrush)	sg. Feb. 27, Nov. 2
94	„ *pilaris* (Fieldfare)	
95	*Daulias luscinia* (Nightingale)	
96	*Saxicola œnanthe* (Wheatear)	arr. Mar. 24
97	*Phylloscopus trochilus* (Willow Wren)	eggs May 30
98	„ *collybita* (Chiff chaff)	seen April 14
99	*Alauda arvensis* (Sky-lark)	sg. Mar. 9
100	*Fringilla cœlebs* (Chaffinch)	sg. Feb. 27
101	*Corvus frugilegus* (Rook)	sg. Mar. 13, nesting Mar. 15
102	*Cuculus canorus* (Cuckoo)	sg. April 21
103	*Hirundo rustica* (Swallow, or Chimney Swallow)	arr. May 16, seen Oct. 11
104	„ *urbica* (House Martin)	arr. Mar. 24
105	„ *rivaria* (Sand-Martin)	
106	*Cypselus apus* (Swift)	arr. May 7
107	*Caprimulgus europœus* (Goatsucker, or Fern-owl)	sg. May 18
108	*Columba turtur* (Turtle Dove)	sg. May 6
109	*Perdix cinerea* (Partridge)	
110	*Scolopax rusticola* (Woodcock)	
111	*Crex pratensis* (Corncrake, or Land Rail)	

MISCELLANEOUS.

(FIRST APPEARANCE.)

112	Frog Spawn	very plentiful Mar. 22

METEOROLOGICAL REPORT.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·12	49·6	42·7	60·8	44·8	44·5	98	10	·02	S.W.
2	29·97	52·4	43·5	78·1	48·1	47·1	93	10	trace	S.W.
3	30·03	49·9	33·9	78·1	39·6	39·3	97	10	·24	S.
4	29·73	45·1	38·6	52·9	47·7	47·6	99	10	·14	S.W.
5	·67	40·4	33·3	73·5	34·6	32·6	79	0	·53	S.W.
6	29·58	33·3	31·3	41·6	32·1	32·1	100	10	·24	N.E.
7	30·03	35·1	16·2	73·4	17·	17·		9	·05	N.
8	29·56	33·4	17·2	80·1	32·9	32·8	99	10	trace	N.W.
9	29·78	32·6	24·1	70·2	25·9	23·8	57	5		N.W.
10	30·04	37·2	24·6	63·1	26·8	26·2	95	8	·07	S.E.
11	29·74	38·3	25·5	47·4	37·3	37·3	100	10	·09	S.
12	30·11	44·6	26·0	79·0	27·6	26·5	78	1	·42	N.
13	29·31	46·5	26·6	73·5	44·5	43·3	91	10	·04	S.W.
14	·82	39·3	33·7	70·3	36·0	33·5	78	8	trace	S.
15	·82	46·3	27·8	73·5	39·3	38·7	95	10	·15	S.
16	·69	42·3	31·5	80.9	33·7	31·9	81	0	·32	W.
17	·49	42·2	31·8	80·5	33·2	32·6	93	1	·21	S.W.
18	·02	36·6	31·8	62·4	32·9	32·6	96	6		N.W.
19	·28	36·0	21·6	62·8	26·9	26·7	95	8	·01	S.E.
20	·48	33·2	22·7	78·3	28·0	27·5	90	1	·14	E.
21	·84	34·2	22·1	44·0	32·3	31·9	94	10	·01	N.
22	·47	32·5	24·3	56·2	27·3	27·0	93	9	·06	N.
23	·44	33·4	31·1	41·1	32·5	32·0	93	10	·11	N.W.
24	·39	36·5	33.5	71·5	32·7	32·4	96	10	·17	S.E.
25	·26	42·2	33·9	79·5	36·1	35·1	91	10	·16	S.E.
26	·50	41·7	35·9	74·6	32·7	31·8	89	0	·03	S.W.
27	·76	41·3	37·7	65·2	38·0	37·8	98	10		S.
28	·83	42·4	34·7	59·0	34·8	34·8	100	10		S.
29	29·61		38·0		36·7	35·4	88	10		S.
30										
31										
Mean	29·61	39·9	30·2	66·7	34·2	33·5	91	7·4	Total 3·21	

FEBRUARY.

Date	Barom. Reduced.	Thermomometers. Max.	Min.	Solar Max.	Dry Bulb	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1										
2		46·1		85·1						
3	29·48	38·2		46·3	36·7	36·5	98	10	·11	N.E.
4	30·04	40·7		74·6	32·4	32·0	94	10	·03	N.
5	·19	37·2		49·2	31·7	31·0	92	10		N.
6	·08	38·0		81·7	24·0			2		N.E.
7	·36	41·3	20·3	79·0	29·9	27·9	67	7		N.
8	·62	39·0	30·0		27·6	27·6	100	3		N.
9	·63	35·7	17·4	77·3	25·0	24·1	77	4		N.E.
10	·40	33·6	16·5	54·5	21·1			10		N.E.
11	·19	39·3	19·8	48·3	33·4	33·1	96	10	·04	N.E.
12	30·037	42·3	32·8	49·9	38·9	38·9	100	10	·07	S.E.
13	29·961	49·3	37·2	82·0	40·6	40·6	100	10	·01	S.E.
14	·799	41·4	37·2	46·1	40·0	38·8	90	10	·06	S.E.
15	·94	38·4	28·2	42·2	34·6	34·0	93	10	·05	N.E.
16	·91	33·1	31·5	35·0	32·6	32·0	92	10	·01	N.E.
17	29·969	36·8	30·8	40·3	31·7	31·7	100	10	trace	N.E.
18	30·150	36·1	30·6	41·8	32·4	32·1	95	10		N.E.
19	·114	32·2	30·4	31·5	31·5	30·9	92	10		N.
20	·201	35·4	30·4	49·8	31·8	31·6	97	10	trace	N.
21	·259	37·7	28·9	66·8	32·1	31·3	89	0		N.E.
22	·321	37·8	25·6	44·0	30·1			10	trace	S.W.
23	·353	32·8	27·9	41·8	30·9	30·9	100	10		N.E.
24	·182	32·8	21·0	64·0	26·4	24·9	66	0	trace	N.E.
25	·143	34·5	25·4	42·3	31·3	30·9	93	10		N.E.
26	·248	38·8	22·5	83·0	30·1	30·1	100	6		N.
27	·308	33·7	24·0	75·6	28·7	28·7	100	9		N.E.
28	30.257	31·6	24·5	42·9	30·9	30·1	87	5	·12	N.E.
Mean	30·159	37·8	26·9	56·7	31·4	31·7	92	7·9	Total ·50	

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·767	37·7	22·8	51·9	30·7	30·7	100	10	·36	N.E.
2	·364	38·6	29·7	81·6	34·9	31·6	70	9	·01	W.
3	·456	34·3	28·5	61·0	31·9	31·2	90	10		N.
4	·899	41 6	21·5	88·2	33·1	32·4	92	0		W.
5	·336	37·9	27·3	69·1	33·2	31·6	83	9		E.
6	29·594	38·3	25·7	73·9	31·7	30·8	88	3		W.
7	30·252	39·5	16·2	87·9	27·7	24·9	53	1		W.
8	·314	40·7	25·3	98·3	32·7	31·2	80	1		E.
9	·390	42·9	24·2		32·4	32·4	100	0		S.E.
10	·403	36·6	22·7	81·4	31 6	30·3	83	10		E.
11	·400	39·7	23·6	80·8	29·2	27·0	64	0		N.E.
12	·352	36·6	25·7	73·8	28·2	26·9	75	10	trace	N.E.
13	·375	34·7	21·9	66·3	29·6	29·6	100	10		N.E.
14	·284	34·5	28·0	71·3	33·8	30·0	64	2		N.E.
15	30·059	35·6	28·4	55·8	31·8	29·6	73	8	·01	N.E.
16	29·887	37·9	20·0	91·3	29·2	28·6	89	6		N.
17	·929	44·8	16·4	91·9	22·7	22·5	94	10	·02	N.W.
18	·999	46·7	21·7	66 4	35·3	33·3	81	10	·08	E.
19	29·997	58·4	34·6	102·0	46·8	46·8	100	10	·11	S.
20	30·033	54·9	42·3	84·1	47·8	47·4	97	10	·12	S.W.
21	·000	60·1	47·0	92·4	48·8	48·8	100	10	·01	S.W.
22	·148	53·4	40·7	76·4	47·9	47·8	99	10	·11	S.W.
23	·161	61·8	47·3	109·9	50·2	50·1	99	9	·01	S.W.
24	30·035	65·0	39·6	105·6	49·8	48·4	90	3		S.
25	29·974	55·2	46·7	81·5	51·9	50·0	87	8	trace	S.
26	977	54·2	46·0	83·0	50·8	48·5	85	9	·22	S.
27	·860	52·8	47·8	72·2	50·2	49·9	98	10	·14	S.
28	·907	57·5	46·7	106·9	49·2	49·0	99	10	·15	S.
29	29·679	52·2	39·2	100·8	47·5	45·7	87	8	·12	S.
30	30·105	48·0	35·7	87·3	45·4	41·9	76	3	·19	S.
31	30·662	52·9	44·4	105·2	46·8	43·8	79	7	·06	S.W.
Mean	30·019	46·0	31·8	83·3	38·3	37·2	86	6·9	Total 1·72	

APRIL.

Date	Barom. Reduced	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative. Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·163	56·7	36·8	115·5	48·3	47·0	91	3	trace	S.W.
2	29·807	55·9	42·2	80 0	55·4	50·4	70	7	·25	S.
3	·900	54·3	41·3	111·6	45·4	43·1	84	9	·01	S.W.
4	·952	50·1	38·6	85·1	46·0	45·4	96	10	·01	S.
5	·951	57·2	41·6	105·3	47·8	45·7	86	10	·02	S.W.
6	29·733	52·9	46·1	109·1	48·9	43·9	67	5	·02	S.W.
7	30·024	47·9	34·8	79·1	44·3	41·7	81	10	·38	S.W.
8		54·5	41·2	71·0	46·1	44·6	90	9	·09	S.W.
9	29·549	46·8	35·8	114·2	41·8	38·5	76	5	·06	S.W.
10	·590	43·5	30·4	96·4	41·1	39·3	86	4	·25	S.
11	29·651	50·8	28·5	91·1	37·0	35·6	87	8	·04	N.
12	30·086	55·5	29·9	103·3	44·1	37·4	56	1	trace	N.
13	·305	53·4	31·9	104·9	49·3	45·1	73	1	·04	W.
14	·308	52·0	40·5	85·3	45·8	43·5	84	6	·01	W.
15	·280	52·9	41·2	106·4	47.2	43·7	76	9	·04	N.E.
16	·231	49·7	35·1	110·1	40·5	39·0	96	4	·03	N.
17	30·090	45·9	35·8	68·3	40·0	38·5	88	10	·01	N.
18	29·889	48·1	39·2	62·2	43·1	41·7	81	10	·14	N.
19	·806	62·5	39·3	114·9	46·0	43·9	86	10	trace	N.
20	29·760	55·6	42·2	101·1	50·1	48·1	86	10		N.
21	30·01	55·7	39·1	71·6	43·1	38·9	71	10		N.E.
22	29·93	54·7	36·2	110·5	44·2	41·1	78	5		N.W.
23	·93	65·8	35·9	110·6	44·9	43·6	90	0		E.
24	29·92	70·2	44·8	115·5	57·9	52·0	67	5	·17	E.
25	30·04	63·9	43·0	108·4	53·4	49·5	75	8		E.
26	30·01	61·2	41·3	105·9	53·3	48·7	71	0		E.
27	29·83	68·0	40·6	113·3	52·9	48·5	72	3		N.E.
28	·55	67·3	38·7	98·6	57·9	52·2	68	5	·10	N.E.
29	29·81	66·7	39·9	96·1	39·9	37·6	82	10		N.
30	30·06	52·6	30·5	114·7	43·1	37·0	59	3		N.
Mean	29·937	55·7	38·1	98·7	46·6	43·5	79	6·3	Total 1·67	

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·14	58·7	26·0	109·3	48·9	40·0	49	0		N.E.
2	·31	55·8	29·9	106·3	46·4	41·1	66	3		N.E.
3	·32	60·3	36·9	106·9	51·6	46·0	66	2		S.W.
4	·33	64·8	30·3	109·5	58·0	48·8	52	2		S.W.
5	·37	68·2	33·6	112·7	59·0	50·0	53	2		S.W.
6	30·26	72·0	39·9	114·8	61·9	50·0	43	0		S.E.
7		72·8	42·3	119·0	64·9	54·8	52	0		S.E.
8	29·96	71·1	48·2	118·5	59·6	50·2	52	8		N.
9	·94	68·8	45·5	116·0	60·9	55·2	68	7		N.E.
10	·77	64·2	42·6	98·7	55·0	52·0	80	8	·05	N.E.
11	·80	64·3	43·7		46·9	46·9	100	10	·22	S.E.
12	·60	64·2	43·2	92·1	47·4	47·2	99	10	1·04	S.E.
13	·07	61·4	46·6	63·8	49·9	49·9	100	10	·08	N.E.
14	·28	47·4	39·5	95·7	43·7	42·4	90	10	·01	N.E.
15	·776	53·1	36·4	108·2	47·4	42·5	68	8	·10	N.W.
16	·849	53·5	41·6	90·8	51·1	50·6	97	10	·18	S.W.
17	·832	59·1	48·1	111·1	52·7	52·7	100	10	·06	S.W.
18	·759	65·1	51·5	114·3	57·1	54·5	83	7	·01	S.
19	·985	57·7	42·8	95·2	50·3	50·0	98	10	·20	S.
20	29·880	63·1	47·3	114·7	57·6	56·8	94	8	·02	S.W.
21	30·143	65·6	43·2	116·9	57·4	54·0	79	5	·36	S.W.
22	·153	60·5	50·8	86·1	54·8	53·0	87	10	·14	N.W.
23	30·114	57·2	48·3	82·1	50·4	50·1	98	10	trace	N.
24	29·431	55·6	49·8	93·0	52·9	52·8	99	10	·34	N.
25	·713	59·0	46·2	108·4	55·4	53·2	86	8	·16	S.W.
26	·641	58·4	46·8	111·0	53·1	49·9	79	9	·41	S.W.
27	·440	55·8	45·2	110·4	45·9	45·8	99	10	·02	N.W.
28	·708	52·4	43·2	108·5	52·7	49·7	80	4		S.W.
29	29·870	60·9	40·8	117·3	51·0	49·0	86	10	·02	S.E.
30	30·003	62·6	37·7	120·3	59·5	55·7	77	3		N.
31	30·027	64·3	43·3	97·6	54·0	52·5	90	9	·31	N.
Mean	29·882	61·2	42·3	104·3	53·5	49·9	80	7·2	Total 3·73	

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	N.E.
1	29·818	68·7	52·7	117·9	55	55.5		10	.04	S.
2	29·938	68·0	48·7	115·3	62·0	56·9	71	1	trace	E.
3	30·121	54·6	47·2	96·9	50·9	50·3	96	10		N.
4	·189	62·0	40·5	111·3	52·4	50·3	86	0		N.E.
5	30·143	62·1	37·2	110·5	51·9	49·8	86	1		N.E.
6	29·967	68·7	37·1	117·3	58·9	56·0	82	1		N.
7	·929	69·1	42·8	122·1	59·6	56·9	84	0		N.
8	·934	67·7	43·3	113·1	59·2	56·5	84	2		N·
9	·840	69·7	47·6	122·7	58·3	56·9	91	6	.06	N.
10	·740	62·4	47·9	110·4	55·8	55·8	100	10	.12	N.E.
11	·974	64·3	49·6	119·2	58·9	56·8	87	4	.03	S.
12	·768	65·0	52·0	119·4	59·7	56·3	80	9	.10	S.E.
13	29·821	62·5	47·7	120 1	57·6	53·6	76	4	.01	N.
14	30·067	60·2	42·9	100·2	57·9	54·6	80	9	trace	S.
15	·062	62·7	49·0	116·9	56·2	55·2	93	6		S.W.
16	·127	62·0	45·0	117·6	56·2	55·0	92	9		S.
17	·097	58·0	44·5	91·9	50·9	49·4	90	10		N.W.
18	30·057	56·2	46·3	86·3	47·1	47·1	100	10	.02	N.
19	29·852	70·7	46·7	118·8	55·9	54·7	92	3	.06	N.
20	29·984	62·1	49·0	104·3	56·1	54·5	89	3		N.
21	30·086	59·1	42·7	97·9	54·1	52·4	88	8		N.
22	29·969	65·7	50 0	111·2	56·7	55·3	91	10	·08	N.E.
23	29·816	65·9	50·4	119·5	58·7	56·4	86	1		S.W
24	30·037	70·4	46·3	120·3	55·9	53·4	84	3		W.
25	·027	70·1	49·6	125·1	62·7	58·7	77	8		N.W.
26	·063	72·8	46·4	128·2	63·1	59·1	77	1		N.W.
27	·163	70·7	49·0	114·3	63·2	59·4	78	0		S.W.
28	·214	73·6	49·0	125·6	65·9	60·5	71	0		S.E.
29	·241	75·0	46·0	113·1	64·9	62·1	83	5		N.
30	30·290	72·5	54·9	123·3	62·0	59·7	87	9	Total .52	N.
Mean	30·011	65·8	46.7	113.7	57·6	55·3	86	5·0		

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·246	71·8	43·5	114·2	61 8	58·7	82	0		N.W.
2	·325	75·9	47·1	120·7	60·8	57 9	88	0		N.E.
3	·333	81·7	49·8	123·4	70·9	67·0	79	0		N.
4	·329	83·7	58·2	130·2	72·3	67·9	77	2		N.E.
5	·285	78·5	59·1	125·0	68·7	65·1	80	0		N.E.
6	30·153	82·3	49·2	130·2	71·5	66·3	73	0		S.
7	29.974	79·5	53·0	134·3	67·2	65·7	91	2		N.
8	29.793	67·0	55·0	120·3	65·9	59·7	67	5		N.
9	30.017	67·0	43·2	120·3	58·2	56·8	91	4	·20	W.
10	·181	66·3	46·2	118·4	57·9	56·2	89	8		W.
11	·193	68·7	45·5	118·2	60·8	59·7	94	10	·15	W.
12	·015	65·0	58·5	99·1	61·4	61·4	100	10	·18	S.
13	30·002	69·3	48·2	122·0	59·0	57·8	92	7	·16	S.
14	29·449	66·5	53·3	121·3	63·6	59·9	79	9	·03	W.
15	·831	67·3	49·0	119·5	57·1	52·9	75	9	trace	S.
16	29·777	67·3	48·1	121·6	61·1	57·0	77	8		S.W.
17	30·041	68·9	52·1	112·1	60·5	57·7	83	5	.09	S.
18	29·893	77·1	56·1	126·2	66·9	63·9	83	3		S.E.
19	29·737	70·1	55·1	121·2	65·8	62·7	83	9	·48	S.W.
20	30·049	72·9	51·3	129·1	60·3	58·7	90	6	trace	S.
21	29·876	80·7	56·0	129·0	72·7	69·1	81	2	·03	S.
22	·858	68·8	58·4	123·4	66·7	62·8	79	6		S.W.
23		63·5	55·9	96·9	60·7	58·9	89	10	·15	S.
24	·637	66·1	57·1	126·2	61·5	59·2	86	9	·03	S.W.
25	·614	71·6	53·3	122·5	59·9	59·9	100	10	·22	S.
26	·468	65·5	51·2	119·5	60·9	57·9	82	4	·24	S.W.
27	29·764	60·1	51·4	108·3	54·2	52·8	90	9		N.E.
28	30·07	61·3	41·9	109·3	57·9	52·6	70	3		N.W.
29	30·02	64·7	49·7	114·6	58·9	56·8	87	10		S.
30	29.70	70·5	54·9	120·4	62·1	61·3	96	10	·02	S.W.
31	29·65	69·2	49·0	120·6	58·2	57·0	92	10	·03	N.W.
Mean	29·942	70·6	51·7	119·9	62.8	60·0	85	5.8	Total 2·01	

AUGUST.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·75	67·3	49·0	120·3	61·3	59·1	87	7	·19	N.W.
2	29·63	65·9	52·1	112·7	53·5	52·8	95	10		N.
3	30·01	65·0	38·7	121·3	57·2	53·6	78	5		N.
4	·05	67·4	47·0	112·3	56·3	54·9	91	10		N.W.
5	30·04	68·8	44·2	117·2	60·2	57·6	84	2		N.
6	29·90	76·5	46·2	118·3	63·4	62·7	96	10		S.W.
7	·91	73·7	58·0	110·2	67·2	65·5	90	9	·01	S.W.
8	·99	73·5	60·6	124·3	67·9	64·7	82	7	·03	S.W.
9	·97	68·0	57·1	100·7	60·1	60·0	99	10	·11	S.W.
10	·77	64·4	58·3	107·2	60·9	60·8	99	10	·02	S.W.
11	·85	65·9	48·8	118·3	58·1	57·6	94	4		S.W.
12	·93	64·5	45·3	116·1	60·3	58·6	90	3	·13	W.
13	·51	67·1	52·6	118·3	61·9	61·1	95	8	·01	S.W.
14	29·73	68·6	50·2	117·2	59·4	58·7	96	10		N.
15	30·05	70·0	52·1	117·3	62·5	60·6	89	8	·16	S.E.
16	29·82	68·7	55·8	121·0	62·2	60·5	90	9		S.
17	29·89	65·3	51·8	120·0	58·9	57·3	89	10		W.
18	30·13	63·9	49·9	106·4	56·7	55·6	93	10	·05	N.
19	·11	71·0	50·8	117·4	59·6	59·5	99	10	·03	N.
20	30·19	69·4	50·9	113·7	60·1	57·3	83	3		N.
21	30·07	75·9	44·0	130·6	64·0	61·0	82	3		N.W.
22	29·97	74·2	52·6	117·7	61·9	60·7	93	10		N.
23	·93	72·4	52·4	112·2	56·0	55·6	97	10	·03	N.E.
24	·85	73·2	54·8	104·7	62·8	61·0	89	6		N.E.
25	29·94	70·7	52·4	116·3	61·9	58·8	82	0		N.
26	30·00	72·2	52·1	119·0	64·3	61·9	86	4		N.E.
27	·09	75·7	55·2	116·2	65·1	63·9	93	10		N.
28	·05	74·6	57·4	122·3	65·7	63·5	87	10		N.E.
29	30·00	78·7	56·9	119·5	67·2	63·1	78	0		N.
30	29·93	83·9	49·6	125·1	71·9	68·1	80	5		E.
31	30·01	84·0	52·1	124·1	67·2	62·7	76	0		S.E.
Mean	29.94	70·9	51·6	116·7	61·8	59·9	89	6·9	Total ·77	

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·06	78·7	53·9	121·4	61·2	60·0	93	10		N.E.
2	·04	81·9	56·0	69·0	58·9	57·9	93	10	·38	N.
3	30·00	69·0	53·1	105·1	60·2	60·2	100	10	·03	N.E.
4	29·97	78·8	61·1	120·1	64·9	64·5	98	10	·05	E.
5	·83	69·7	52·7	116·4	64·2	61·9	98	9		S.E.
6	·94	69·5	47·2	113·3	62·9	60·4	85	5	·09	N.E.
7	·97	68·5	43·9	112·5	60·0	57·9	88	2		N.
8	·85	65·6	34·8	110·2	60·9	59·2	90	3	·02	S.W.
9	·87	63·8	41·6	110·3	63·3	62·3	94	4	·03	S.W.
10	·65	64·0	55·5	101·9	62·8	62·8	100	10	·37	S.W.
11	·96	66·6	46·8	119·4	59·0	56·2	82	4	·02	S.W.
12	29·95	66·3	42·3	99·2	60·9	60·9	100	10		S.E.
13	30·02	73·7	54·7	119·4	67·8	66·0	89	7		N.E.
14	·01	74·7	43·0	117·2	64·6	62·0	86	0		N.W.
15	·30	67·7	49·0	104·2	59·1	59·0	99	4		E.
16	·40	64·5	47·1	112·2	56·0	56·0	100	9		S.E.
17	·21	65·1	46·5	97·2	58·8	57·9	94	0		S.E.
18	·09	66·7	34·4	89·4	57·9	57·1	94	0		N.E.
19	30·089	65·8	35·7	113·7	54·7	54·2	97	6		N.E.
20	29·954	62·8	41·3	112·2	53·3	51·5	87	8		N.
21	·689	65·1	38·5	114·6	54·9	54·4	97	10	·02	N.E.
22	29·749	60·5	45·3	103·2	52·9	52·9	100	8	trace	N.E.
23	30·078	56·5	38·1	110·1	48·9	47·4	90	3		N.E.
24	·177	55·4	42·9	87·4	48·9	48·8	99	10		N.
25	·161	58·1	43·5	92·1	49·3	48·9	97	10	·12	S.E.
26	30·100	65·3	47·3	109·3	52·9	52·8	99	10	·06	S.E.
27	29·969	60·9	46·4	91·5	56·9	56·5	97	10	·43	S.
28	30·162	63·0	46·1	115.5	53·9	53·8	99	1	trace	S.W.
29	·079	69·2	53·0	114·5	61·7	61·1	96	10		S.W.
30	30·009	76·4	54·1	109·1	58·7	58·2	97	10	trace	S.
Mean	30·011	67·1	49·9	107·1	58·3	57·4	95	6·6	Total 1·62	

AUGUST.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·75	67·3	49·0	120·3	61·3	59·1	87	7	·19	N.W.
2	29·63	65·9	52·1	112·7	53·5	52·8	95	10		N.
3	30·01	65·0	38·7	121·3	57·2	53·6	78	5		N.
4	·05	67·4	47·0	112·3	56·3	54·9	91	10		N.W.
5	30·04	68·8	44·2	117·2	60·2	57·6	84	2		N.
6	29·90	76·5	46·2	118·3	63·4	62·7	96	10		S.W.
7	·91	73·7	58·0	110·2	67·2	65·5	90	9	·01	S.W.
8	·99	73·5	60·6	124·3	67·9	64·7	82	7	·03	S.W.
9	·97	68·0	57·1	100·7	60·1	60·0	99	10	·11	S.W.
10	·77	64·4	58·3	107·2	60·9	60·8	99	10	·02	S.W.
11	·85	65·9	48·8	118·3	58·1	57·6	94	4		S.W.
12	·93	64·5	45·3	116·1	60·3	58·6	90	3	·13	W.
13	·51	67·1	52·6	118·3	61·9	61·1	95	8	·01	S.W.
14	29·73	68·6	50·2	117·2	59·4	58·7	96	10		N.
15	30·05	70·0	52·1	117·3	62·5	60·6	89	8	·16	S.E.
16	29·82	68·7	55·8	121·0	62·2	60·5	90	9		S.
17	29·89	65·3	51·8	120·0	58·9	57·3	89	10		W.
18	30·13	63·9	49·9	106·4	56·7	55·6	93	10	·05	N.
19	·11	71·0	50·8	117·4	59·6	59·5	99	10	·03	N.
20	30·19	69·4	50·9	113·7	60·1	57·3	83	3		N.
21	30·07	75·9	44·0	130·6	64·0	61·0	82	3		N.W.
22	29·97	74·2	52·6	117·7	61·9	60·7	93	10		N.
23	·93	72·4	52·4	112·2	56·0	55·6	97	10	·03	N.E.
24	·85	73·2	54·8	104·7	62·8	61·0	89	6		N.E.
25	29·94	70·7	52·4	116·3	61·9	58·8	82	0		N.
26	30·00	72·2	52·1	119·0	64·3	61·9	86	4		N.E.
27	·09	75·7	55·2	116·2	65·1	63·9	93	10		N.
28	·05	74·6	57·4	122·3	65·7	63·5	87	10		N.E.
29	30·00	78·7	56·9	119·5	67·2	63·1	78	0		N.
30	29·93	83·9	49·6	125·1	71·9	68·1	80	5		E.
31	30·01	84·0	52·1	124·1	67·2	62·7	76	0		S.E.
Mean	29.94	70·9	51·6	116·7	61·8	59·9	89	6·9	Total ·77	

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·06	78·7	53·9	121·4	61·2	60·0	98	10		N.E.
2	·04	81·9	56·0	69·0	58·9	57·9	93	10	·38	N.
3	30·00	69·0	53·1	105·1	60·2	60·2	100	10	·03	N.E.
4	29·97	78·8	61·1	120·1	64·9	64·5	98	10	·05	E.
5	·83	69·7	52·7	116·4	64·2	61·9	98	9		S.E.
6	·94	69·5	47·2	113·3	62·9	60·4	85	5	·09	N.E.
7	·97	68·5	43·9	112·5	60·0	57·9	88	2		N.
8	·85	65·6	34·8	110·2	60·9	59·2	90	3	·02	S.W.
9	·87	63·8	41·6	110·3	63·3	62·3	94	4	·03	S.W.
10	·65	64·0	55·5	101·9	62·8	62·8	100	10	·37	S.W.
11	·96	66·6	46·8	119·4	59·0	56·2	82	4	·02	S.W.
12	29·95	66·3	42·3	99·2	60·9	60·9	100	10		S.E.
13	30·02	73·7	54·7	119·4	67·8	66·0	89	7		N.E.
14	·01	74·7	43·0	117·2	64·6	62·0	86	0		N.W.
15	·30	67·7	49·0	104·2	59·1	59·0	99	4		E.
16	·40	64·5	47·1	112·2	56·0	56·0	100	9		S.E.
17	·21	65·1	46·5	97·2	58·8	57·9	94	0		S.E.
18	·09	66·7	34·4	89·4	57·9	57·1	94	0		N.E.
19	30·089	65·8	35·7	113·7	54·7	54·2	97	6		N.E.
20	29·954	62·8	41·3	112·2	53·3	51·5	87	3		N.
21	·689	65·1	38·5	114·6	54·9	54·4	97	10	·02	N.E.
22	29·749	60·5	45·3	103·2	52·9	52·9	100	8	trace	N.E.
23	30·078	56·5	38·1	110·1	48·9	47·4	90	3		N.E.
24	·177	55·4	42·9	87·4	48·9	48·8	99	10		N.
25	·161	58·1	43·5	92·1	49·3	48·9	97	10	·12	S.E.
26	30·100	65·3	47·3	109·3	52·9	52·8	99	10	·06	S.E.
27	29·969	60·9	46·4	91·5	56·9	56·5	97	10	·43	S.
28	30·162	63·0	46·1	115.5	53·9	53·8	99	1	trace	S.W.
29	·079	69·2	53·0	114·5	61·7	61·1	96	10		S.W.
30	30·009	76·4	54·1	109·1	58·7	58·2	97	10	trace	S.
Mean	30·011	67·1	49·9	107·1	58·3	57·4	95	6·6	Total 1·62	

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·674	65·2	50·0	119·4	64·5	64·5	100	3	·39	S.E.
2	29·900	63·7	45·4	116·8	55·3	54·0	92	0	trace	S.
3	30·050	64·9	44·3	108·7	53·8	53·5	98	3	trace	S.E.
4	29·952	76·4	51·4	114·9	64·9	63·0	89	1		N.E.
5	·832	75·1	51·6	113·0	62·7	61·5	93	1	·17	N.E.
6	·832	62·7	52·0	117·2	55·0	55·0	100	10	·42	N.W.
7	·837	60·7	50·6	85·7	55·9	55·9	100	10	·01	N.E.
8	·946	64·1	47·8	104·4	51·9	51·9	100	10	trace	S.
9	·898	61·7	41·6	95·0	48·8	48·8	100	10	·23	S.
10	·752	60·1	41·3	109·1	57·9	57·0	94	1	·05	S.
11	·890	60·2	45·0	108·2	51·7	50·4	91	1	·05	N.W.
12	·692	62·4	49·7	98·0	56·3	56·0	98	7	·40	S.
13	29·411	52·6	44·0	91·0	50·6	49·8	94	8	·01	S.W.
14	28·695	59·0	38·3	111·9	48·2	47·8	97	2	·16	S.W.
15	29·118	56·4	45·3	95·8	55·3	54·6	95	10	·29	S.
16	·616	50·9	45·5	63·2	48·0	48·0	100	10	·22	S.
17	·098	52·3	41·3	98·1	47·3	47·2	99	9	trace	N.W.
18	·418	54·0	32·3	77·9	47·4	47·4	100	10	·05	N.
19	·573	54·6	46·3	73·9	49·9	49·9	100	10	1·01	N.
20	·665	53·4	44·5	77·3	47·7	47·7	100	10	·01	N.
21	29·917	54·4	41·2	80·2	45·0	45·0	100	10	·01	N.W.
22	30·032	57·7	34·3	98·7	44·7	44·7	100	0	·02	S.E.
23	·007	56·9	41·5	88·3	50·0	50·0	100	10	trace	S.
24	·190	54·8	45·6	92·2	49·4	49·0	97	5	·02	N E.
25	·232	50·1	46·7	87·3	48·8	48·8	100	10	·08	N.E.
26	30·138	48·6	45·4	89·5	47·7	46·7	93	10	·01	N.
27	29·888	48·1	43·5	52·1	46·1	45·8	98	10	·15	N.E.
28	30·056	56·7	44·7	81·8	47·9	47·9	100	10	·03	N.E.
29	·249	62·0	47·0	105·2	49·4	49·4	100	9	trace	S.E.
30	·389	58·1	50·1		52·7	52·7	100	10		E.
31	30·097	58·4	50·4	70·5	55·1	55·1	100	10	·55	S.
Mean	29·808	58·6	45·1	94·0	51·9	51·6	97	6·9	Total 4·34	

The covering of the wet bulb having become dirty the Relative Humidity is probably a little too high.

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·044	58·7	49·3	101·4	51·9	51·9	100	10	trace	W.
2	·152	57·5	47·4	83·3	48·7	48·3	97	3	·02	S.
3	30·170	52·6	33·7	93·9	40·1	39·7	97	6	·23	S.E.
4	29·923	53·4	37·6	92·4	41·7	40·7	92	1	·08	S.
5	29·558	49·6	40·2	84·6	45·9	45·5	97	10	·69	S.
6	28·986	49·6	36·3	87·1	42·8	41·3	88	10	·09	S.
7	29·579	47·6	32·9	86·4	38·2	37·1	90	1	trace	W.
8	·811	49·6	27·5	89·7	33·2	32·0	87	2	·01	E.
9	·271	44·8	31·5	52·1	45·4	44·8	96	10	·52	S.E.
10	·350	44·9	31·6	50·0	43·3	43·1	98	10	·26	N.
11	·575	44·1	35·7	47·5	44·1	43·0	92	10	·57	N.
12	·544	45·9	37·6	52·7	41·5	41·1	97	10	·08	S.
13	·511	48·9	37·6		41·4	40·9	96	8	·02	S.W.
14	·582	50·4	40·2	79·3	47·1	44·3	80	2	trace	W.
15	·585	52·6	43·9	60·2	46·7	46·2	97	10	·10	S.E.
16	·610	49·2	41·2	91·9	42·9	42·2	95	3	·26	N.W.
17	·395	52·9	34·3	92·8	48·5	48·1	97	10	·12	S.
18	29·967	48·7	37·2	98·0	40·7	38·8	85	3	·01	N.W.
19	30·257	52·6	29·9	76·5	36·0	35·8	98	9	·01	S.
20	·354	53·6	35·5	72·0	49·3	49·0	98	8	trace	S.E.
21	·379	49·8	43·8	59·5	48·5	47·3	92	10	·01	N.W.
22	·508	39·6	29·6	59·1	30·4	30·3	98	4		N.W.
23	·614	43·0	25·3	73·5	26·9	26·9	100	1		N.
24	·756	45·0	26·5	80·1	26·9	26·9	100	0	trace	N.W.
25	·634	46.1	27·3	55·3	43·5	43·2	98	10	trace	N.W.
26	·532	46·4	42·2	50·6	43·8	43·0	94	10		E.
27	·489	44·7	41·8	49·6	41·9	41·2	95	10		N.
28	30·420	49·8	40·3	51·9	41·6	41·1	96	10	·08	E.
29	29·848	49·3	38·8	74·9	48·1	48·0	99	9	·01	S.
30	29·692	44·5	35·2	82·9	35·9	34·8	90	1	·01	S.
Mean	29·937	48·8	36·4	73·4	41·9	41·2	95	6.7	Total 3·18	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°	0—10	In	
1	29·950	42·2	29·3	80·2	32·9	31·8	84	1	·02	S.
2	29·927	34·0	28·1	70·3	28·5	26·3	62	0		N.W.
3	30·111	38·6	20·1	76·2	20·6	20·3	90	0	·16	S.E.
4	29.806	42·4	19·6	78·0	38·9	38·9	100	10	·43	S.
5	30·111	49·8	28·3	50·2	30·9	29·7	82	1	·03	S.E.
6	29·847	53·0	31·3	99·7	48·9	48·8	99	10	·07	W.
7	29·408	45·5	40·3	81·4	41·2	38.3	77	1	·73	S.
8	28·636	47·8	36·2	72·2	40·9	40·9	100	10	·11	S.
9	28·434	44·6	37·1	80·2	42·7	39·9	78	9	·13	W.
10	29·232	43·7	34·3	76·7	35·9	35·6	97	1	·04	W.
11	·432	50·5	33·3	86·4	43·3	43.3	100	10	·27	S.
12	·379	45·7	39·2	81·6	41·0	38·9	83	3	·07	S.
13	·735	44·4	39·6	49·3	43·8	41·9	86	10	·14	S.
14	·507	48·9	37·8	80·7	39·4	39·0	97	10	·58	S.
15	·097	45·6	38·0	74·5	42·8	42·6	98	8	.05	S.
16	·412	40·2	33·5	66·2	36·4	36.2	98	8	trace	S.
17	·688	32·2	26·5	34·1	29·9	29·8	98	10		N.
18	·789	33·7	23·0	67·3	23·7	22·9	83	0		N.W.
19	29·841	36·5	19·7		21·6	21·4	94	0		E.
20	30·044	32·5	15·4	51·0	18·7	18·4	89	0		N.
21	30·445	33·7	16·8	42·0	26·7	26·7	100	10		N.W.
22	29·89	42·8	15·6	44·7	34·0	33·8	98	10	·28	S.E.
23	·65	41·5	33·5	78·4	37·6	34·8	77	4		S.W.
24	·57	44·2	34·2	70·3	39·0	38·1	92	8		W.
25	·87	42·7	31·9	76·6	33·9	32·8	88	0	·15	W.
26	·81	40·5	31·3	79·1	36·4	35·9	96	10		E.
27	·75	40·5	32·0	80·2	34·9	33·1	82	0		N.
28	·79	41·6	32·0	79·0	38·7	37·8	92	6		N.
29	29·85	44·5	34·7	87·8	38·4	35·5	76	8	1·71*	N.W.
30	30·21	46·3	25·1	72·1	26·7	26·1	86	0		N.W.
31	30·47	34·1	20·6	57·8	29·9	29·9	100	10		N.
Mean	29·698	42·1	29·6	70·8	34·8	33·5	90	5·4	Total 4·97	

* Principally snow which fell during the night of the 26th—27th. Rain fell also on the 28th.

Total rainfall for the year 28·24 in.

ZOOLOGICAL REPORT.

This Summer a great many Grass Snakes (*Tropidonotus natrix*) were caught by members of the College, and it was found that they were exceedingly common in the meadows around the Blackwater; in July a curious variety of this species came under my notice the underneath being dull white with one longitudinal black line running from neck to tail, it was a small individual about 16 inches long, and the back was a dirty black; I have never seen one like it from any other part of the country.

It may also be interesting to record that on June 22nd. some one here was bitten by a young viper, 6 inches 1 line in length, but was quite well again in a few days. Also that a specimen I had in captivity of the Comon Lizard (*Lacerta rivipera*) laid on July 16th eight eggs, these eggs were of different colours some light reddish brown, some grey and some half one colour and half the other. In one egg I dissected (four lines in length, oval in shape) I found some orange-yellow coloured yoke and a small lizard, perfectly formed but with a very large head, when relieved from the enveloping skin of the egg it for a short time showed signs of life, it was 1 inch $2\frac{1}{2}$ lines in length; it is an interesting fact that the viviparous lizard should sometimes lay eggs. A rather handsomely marked Sand Lizard (*Lacerta agilis*) ♀ was caught just outside Great Gate, on June 15th.

The House Martins (*Hirundo urbica*) arrived early this year, some specimens being seen flying round College as soon as March 24th. and a good many were seen early in April.

The Green Woodpecker (*Picus viridis*) was more than usually abundant this year in the woods about Heathpool.

S. S. FLOWER,

Zoological Album Keeper.

ENTOMOLOGICAL REPORT.

The following species not hitherto recorded as found in the neighbourhood were all captured by Mr. Raynor.

Lobophora Lobulata (imago)	.. ..	May 4th.
Eupithecia Pumilata (imago)	.. ..	May 4th.
Eupithecia Tenuiata (larva)	.. ..	May 4th.

EIGHTEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1887.

"Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης."

Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

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GEORGE BISHOP.

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Contents.

RULES:

1. That this Society be called the "Wellington College Natural Science Society.

2. That the Society consist of Honorary Members, Corresponding Members, Members and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-president without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Associates elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers to be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

OFFICERS.

PRESIDENT—S. A. SAUNDER, ESQ.

VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD.

SECRETARY { P. B. NORRIS, H. A. CRUICKSHANK | TREASURER { J. C. V. DURELL, A. C. DEANE

ALBUM KEEPERS.

METEOROLOGICAL { A. J. V. DURELL, G. WHITFIELD
ENTOMOLOGICAL—H. B. de V. WILKINSON
BOTANICAL { A. D. SCHOFIELD, L. F. S. HORE
ETHNOLOGICAL—A. LYON
ZOOLOGICAL—S. S. FLOWER
GEOLOGICAL—F. S. GOLDINGHAM.

CORRESPONDING MEMBERS.

THE ARCHBISHOP OF CANTERBURY.

CAN. TRISTRAM, D.D., F.R.S.
PROF. RUPERT JONES., F.R.S.
B. E. HAMMOND, ESQ.
COL. C. COOPER-KING, F.G.S.
REV. H. HULEATT.
H. W. EVE, ESQ.
REV. T. H. FREER.
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REV. A. CARR.
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C. E. WILLIAMS, ESQ.
T. H. FRENCH, ESQ.
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R. MOORE, ESQ.
H. E. HUNTINGTON, Esq.
R. H. WHITCOMBE, ESQ.
E. F. ELTON, ESQ.
H. M. BURGE, ESQ.
C. R. CARTER, ESQ.
A. H. FOX-STRANGWAYS, ESQ.

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J. W. WILLIAMS†
J. C. V. DURELL
S. S. FLOWER*
J. R. de M. ABBOTT
A. GRANT-DUFF.‡
H. B. de V. WILKINSON
P. B. NORRIS†
F. S. GOLDINGHAM*
F. H. SMITH†
A. L. HINE-HAYCOCK
A. LYON†
R. SPARROW
L. F. S. HORE
A. C. DEANE
S. T. HANKEY
H. A. CRUICKSHANK

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R. CLAYTON-BROWNE‡
E. H. ARMSTRONG†
A. U. STOCKLEY*
HON. F. H. STANLEY†
G. A. BECHER
W. S. TALBOT*
R. CRAWLEY†
H. LAING
J. HAY†
E. F. KNIGHT
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G. L. BUSK†
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A. E. C. MYERS
R. OAKLEY
F. N. RECKITT
H. C. CHAWORTH-MUSTERS
C. WATERER
W. T. WILLETT
E. A. BRACKENBURY‡
F. M. LANE
W. SANGER
E. B. MACNAGHTEN
R. H. TAHOURDIN
W. R. P. STAPLETON-COTTON
P. G. STEWART

* Left Lent Term, 1887. † Left Easter Term, 1887. ‡ Left Michaelmas Term, 1887.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College N.H.S.

Cheltenham College N.H.S.

*Marlborough College N.H.S.

Clifton College N.H.S.

*Rugby School N.H.S.

*Dulwich College N.H.S.

*Haileybury College N.H.S.

*King Edward's School, Birmingham, N.H.S.

*Felsted School N.H.S.

*East Kent N.H.S.

British Museum (Natural History.)

*U. S. Geological Survey Office.

Linnean Society.

Royal Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	29	9	4
Subscriptions:			
Lent Term—Honorary Members ...	1	7	0
,, ,, Members and Associates	4	15	0
Easter Term—Honorary Members ...	3	11	0
,, ,, Members and Associates	4	9	6
Michaelmas Term—Honorary Members	1	12	6
,, Members and Associates	3	13	0
Sale of Report	8	4	4
	£57	1	8

Examined and found correct, S. A. SAUNDER.
Dec. 20, 1887.

Expenditure.

	£.	s.	d.
Becker for Battery Cells		11	0
Harvey and Peak for refilling prisms ...		2	6
Hire of slides		15	3
Lepidoptera Prize		10	0
Engraving Pender Prize		4	6
Perkins and Glasse for reading thermometers &c. ...	1	1	0
Ifould for charging battery &c.		3	0
Stamps		10	4
Carriage of Parcels		12	3
Bishop for printing Report &c.	10	2	3
Balance in hand	42	9	7
	£57	1	8

A. C. DEANE, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 19th.

The Rev. P. H. Kempthorne opened a discussion on "Photography", which was maintained by Mr. Whitcombe, Mr. Elton, Mr. Caulfeild, V. L. Johnstone, E. H. Smith, J. R. de M. Abbott, P. B. Norris, J. W. Williams, and S. S. Flower.

At the conclusion a vote of thanks to Mr. Kempthorne was proposed by The President.

Saturday, March 12th.

H. M. Elder, Esq. gave a lecture on "Coal Tar Drugs, Flavours and Perfumes."

Colours are not the only beautiful and curious things obtained from coal tar, many useful drugs have been lately derived from it. It was when searching for a method of preparing quinine artificially in 1856 that Perkin stumbled on the first of the coal tar colours, mauve; since then, though no chemist has yet succeeded in preparing quinine itself, some three or four ante-pyretic medicines have been obtained. The most noticeable of these is antipyrin which was discovered by Dr. L. Knorr in 1883. It has been successfully used in cases of typhoid fever and lowers the temperature of the body from two to three degrees. Thallin is another drug that has been used with success in yellow fever. Salicylic acid is also an exceedingly valuable drug, especially in cases of rheumatic fever. It lowers the temperature and takes away the pain when given in large doses, though at the same time it induces almost total deafness and certain illusions. These however pass away as the effect of the drug wears off. Artificial fruit essences can hardly be said to be obtained from coal tar, but since they are the products of the skill of the organic chemist they may fairly be referred to in speaking of coal tar bodies. They are chiefly obtained from a horrible smelling spirit distilled from potatoes and called amyl alcohol or fusil oil. The most important are Pine-apple oil or Butyric ether, Apple oil or Amyl Valerianic ether and Pear oil or Amyl Acetic ether. These and some others are used largely in flavouring confectionery. Pear

oil is perhaps the most commonly used and its odour can readily be recognized in "Pear drops." The flavours of nearly all fruits may be imitated by mixtures of these essences with, in some cases, a little almond oil. Returning again to true coal tar products, the artificial oil of bitter almonds or essence of mirbane claims attention. This is nitro-benzol and is manufactured in large quantities for use in perfuming soap.

Picric acid, a well known yellow dye, is sometimes used by unscrupulous brewers as a substitute for hops, and to give a bitter flavour to their beer, but as its dyeing powers are so great it is easily detected by soaking a little white wool in the beer.

Coumarin is a sweet smelling crystalline body which is found in the Tonquin bean. When dissolved in spirit it forms the well known "Essence of new mown hay." This however is generally prepared from the bean itself rather than from artificial coumarin.

Vanillin, the aromatic principle of the Vanilla bean, is another body that has been artificially prepared. This is interesting, as the scent "Essence of Heliotrope" is now made by dissolving vanillin in alcohol and adding a small proportion of nitro-benzol, the artificial oil of bitter almonds.

Perhaps the most astonishing of all the bodies obtained from coal tar is saccharine. This was discovered in America by Constantin Fahlberg and Remsen. It possesses two hundred and twenty times the sweetening power of sugar and it is said that a solution of one part in ten thousand of water tastes distinctly sweet. It has been shown already to have no action whatever on dogs and should it have none on men it will no doubt be largely used by those who are forbidden by their doctors to eat sugar. It is also antiseptic in its properties. We may therefore expect that it will be used to sweeten and preserve jams. In fact it seems as if the time is near when jams flavoured with artificial essences and sweetened with saccharine, and so absolutely innocent of fruit or sugar, may appear in the market.

A vote of thanks to the lecturer was proposed by Mr. Williams.

Saturday, May 14th.

Dr. Paterson gave a lecture on "The Skin."

The skin seldom receives the recognition it deserves considering how useful and indispensable an organ it is; and this want of recognition is very much due to its being so universally present to our consciousness that from constant familiarity we come to overlook its very existence, until the pain of a bruise or

blister reminds us of it. Nor can we dispense with it, even in part—serious injury (as by burn or scald) to one-eighth of the entire skin is usually fatal to the sufferer.

Two great functions are fulfilled by the skin—it is an organ of sensation, and a covering for underlying structures; and it may be divided in two parts corresponding to these functions, a deeper layer, protecting the tissues of the body, and a more superficial layer, containing the delicate organs of touch—these, which together make up the *dermis* or true skin, are again covered by the *epidermis*, scarf skin, or cuticle.

The cuticle, the outermost layer of the skin, is that part which is separated from the deeper layers when the skin is blistered; it is non-sensitive, and may be cut without pain being felt—tough and horny in structure—protects the sensitive true skin beneath, as is evident from the pain felt when the true skin is exposed in a broken blister—and is very elastic. It modifies to a bearable degree the impressions which cause sensation in the true skin—it impedes evaporation from the surface, thus keeping the true skin soft and moist—and it checks absorption, so that substances which are injurious to the true skin may be handled with impunity. Where exposed to friction or pressure, its thickness is increased, as on the palms and soles, the needle-woman's forefinger, or the stonemason's thumb. It contains neither bloodvessels nor nerves—its thickness varies from $\frac{1}{240}$th. to $\frac{1}{18}$th. of an inch. Prolonged soaking in water causes it to separate into two layers, a superficial *horny layer*, and a deeper, softer layer, the *mucous layer*. The latter is darker in colour than the former—it contains the pigment granules which, in the negro, give the skin its dark colour, and in the white races confer on it at times a tawny hue. When the skin of a negro has been macerated in water, so that the cuticle as a whole separates, the underlying true skin is found to be quite devoid of colour. Pigment is present in the cuticle even of white skinned mankind, though the granules are sparse and nearly colourless—when such skins are exposed to sun and air, the pigment increases and the tint deepens, and we have sunburnt complexions. In the dark skin of the negro we see the effect of this process continued through many generations, and heightened by hereditary transmission.

The deeper surface of the cuticle, lying next the true skin, is closely attached and accurately moulded to it; the surface of the true skin is raised into numberless little eminences, called *papillae*, and on the under surface of the cuticle may be seen little pits, into which, when it was in position, fitted the papillae of the true skin. The cuticle dips downward and lines the ducts of the sweat-glands and the pits or follicles in which the hairs grow.

The nails and hairs are specially modified outgrowths of the cuticle—the former defending the tips of the fingers and toes, and the latter growing on all parts of the body, except the palms and soles, the backs of the last joints of the fingers and toes, and the upper eye-lids. The nails are specially thickened parts of the horny layer of cuticle, growing on a portion of the true skin of the finger called the bed of the nail—they are designed to protect the ends of the digits, and to give firmness to them, so aiding in fine manipulation, and hence they must be firmly attached to the finger—and yet they constantly grow both in length and thickness. Their growth in length, and consequent movement over the bed, is provided for, without any diminution in the firmness of their attachment, by the papillae of the bed being arranged in parallel rows from root to edge of the nail, the under surface of the nail being grooved so as to fit closely to these rows and to dip down into the intervening furrows. The papillae are very vascular, and with a magnifying glass we can readily see fine red and white lines running from root to edge of a finger nail—the red lines are the rows of vascular papillae, showing through the transparent nail, and the white lines are due to the downward growth of the nail into the furrows between the rows of papillae. These papillary ridges of the true skin add fresh substance constantly to the under surface of the nail, and thus increase its thickness—while at its roots similar additions are being made, and thus the whole nail is constantly being pushed forward. When a nail receives a bruise or blow such as to disturb its growth at the part struck, the injured cells on its under surface become opaque, and a white spot is seen on the nail. If the foot is confined in too short a boot, so that the nail of the great toe has not room to grow in length, it increases much in thickness and in breadth, pressing into the skin at the sides—or the pressure in front may irritate and inflame the true skin at the root. The nails grow about $\frac{1}{32}$nd. of an inch per week—rather faster in summer than in winter, and in the right hand than in the left.

The hairs are outgrowths of the cuticle, which, round the root of each hair, is depressed into a pit, called the hair-follicle. Each hair springs primarily from a growth downwards of the mucous layer of the cuticle—the follicle is at first closed above, and the young hair has to make its way through the overlying cuticle ere it can reach the surface. All hairs grow in a slanting direction, except the eye-lashes which are implanted perpendicularly to the surface. Each hair grows by addition of new material to its lower end, which is attached to a papilla at the bottom of the follicle. Hairs, when left uncut, grow to a certain length and are then thrown off by a process analogous to the moulting of birds—they are replaced by young

hairs growing from the same follicles ; when the hairs are closely shaved, however, they do not fall out, but grow continuously, increasing in growth and strength. It has been calculated that the hair of the beard grows on an average $\frac{1}{8}$th. of an inch in a week—at this rate the beard would grow six and a half inches in a year, and a man who lived to be eighty, and who shaved regularly from adolescence, would have removed nine yards of hair from his chin. Each hair follicle is supplied with muscular fibres, which, on the exposure of the skin to cold, contract, and elevate the follicle and the hair, producing "goose skin." Into each hair follicle opens the duct of a sebaceous gland, which pours into the follicle an oily material, serving to keep cuticle and hairs soft and flexible.

The true skin is the most useful of the various parts of the skin —it contains blood-vessels and nerves, is the organ of sensation, provides a defence, and forms a warm covering, for the body. In it are lodged the sweat glands, which send their ducts to the surface of the skin, passing in a spiral form through the cuticle. It consists of a close network of fibres, among which are lodged little masses of fat, which keeps in the warmth of the body, and acts as a padding, especially on palms and soles.

The effect on the skin of long continued irritation was very marked in the case of a man who worked among paraffin oil, whose arms were covered with numerous horny outgrowths, some over an inch long, the condition being due to the irritation of the skin by paraffin.

The lecture was illustrated by a number of microscopic sections of skin, shown by means of the lime light.

A vote of thanks to the lecturer was proposed by Mr. Goodchild.

Saturday, May 28th.

G. M. Heath, Esq., R.E., gave a lecture on "The Bechuanaland Expedition of 1884—5."

The objects of the expedition were to drive out the "filibusters" —Boers who had treked into the native territory of Bechuanaland taking possession of the farms and driving out the cattle,—and also to find the murderers of Mr. Bethel. The lecturer had not started with the main body of the expedition but was sent out from England two months later with a small draft for the telegraph section. On landing he had to proceed up country at once with his detachment. The first 600 miles, as far as the Orange River, were easily passed over by a winding railway which sometimes reached an altitude of 6000 feet above the sea. A march of 100 miles brought them to Barkly West, the base of

the expedition, several difficulties, of which the lecturer gave a most amusing description, having to be overcome on the road.

The country as far north as Kanza consists of vast plains, devoid of trees, but covered in parts with bush consisting almost wholly of thorns, the worst of which are called by the natives the "wait a bit" thorn; when once entangled in one of them the only thing to be done is to tear one's clothes away as economically as possibly. Every few miles small flat-topped rocky hills called "koppes" spring abruptly out of the ground. The plains are covered with good green grass which in winter dries completely yellow. When in this state it is sometimes set alight by the natives in order to clear off the old stuff and make room for the new. These veldt fires travel with such rapidity that they only singed the bamboo telegraph poles as they passed.

Water is scarce and the chief business of the sappers was to find it. The so-called rivers consist for half the year of a series of disconnected puddles, but water was always found by digging beneath the beds of the streams.

Game is very plentiful, the country is the special home of the antelope and in the more remote parts there are lions, giraffes and ostriches. There are also a great variety of wild fowl.

The climate is splendid, though in winter the nights are cold and sometimes there is frost. When marching the expedition as a rule slept without tents.

The lecturer's special branch was the Field Telegraph. The line of communications extended for more than 300 miles, with fortified posts every 30 or 40 miles, and small bodies of ten or twenty mounted men every 15 or 20 miles. From six to eight miles were laid on an average every day, but on parade, or at an inspection, the wire can be run up at the rate of three miles an hour.

Going up country the signallers worked from the immediate front to the head of the telegraph line, but the line was erected generally as fast as the troops moved up. During the day signalling was carried on by heliograph, there being plenty of sun with a clear atmosphere, at night lime-light lamps were used. The great difficulty was to find suitable hills for the purpose and in some cases artificial mounds had to be raised.

Telephones were occasionally employed on the line but their action was too uncertain for general use though one of the clerks who was a good cornet player used frequently, after work, to entertain the rest of the section, sometimes at a distance of 60 miles, with music from the latest comic opera. The line was patrolled by horsemen every day who effected temporary repairs, and every 70 miles was under the charge of a working party of four or five men with a Scotch cart and team of six mules whose duty it was to be continually moving along the line and

thoroughly repairing the lineman's work.

There was one Field Company of Royal Engineers consisting of 120 men whose chief duty was to find water, and all the watering places were also fortified by them. The most common class of redoubt was made by building a wall of stones and protecting this in front by earth and a ditch. Sometimes a thick hedge of mimosa thorn was constructed about 200 yards outside the wall which would break the rush of an enemy and give the defenders inside the fort time to use their guns.

In this expedition balloons were used for the first time by English troops and would probably have been of great service had there been any fighting. They were made of thin skin, something like, but stronger than, gold beater's skin and the hydrogen for inflating them was carried out from England compressed in steel cylinders. When ready for use they were tethered to wagons and let up and down as required.

A vote of thanks to the lecturer was proposed by Mr. Davenport.

Saturday, June 11th.

R. H. Whitcombe, Esq. gave a lecture on "Spectrum Analysis."

When a beam of light is passed through a glass prism, its path on emerging is bent or refracted from its former direction. Newton found that the amount of refraction varied with the colour of the light, and showed the composition of white light by allowing the light of the sun, shining through a small circular hole in the shutter of a dark room, to fall on a prism, when a band of colours was produced on the opposite wall, in which red yellow, green, blue and violet could be distinguished in order. If a narrow slit is substituted for a round hole the same series of bands of colour is produced, but they are clearer and better defined, because they do not overlap one another so much, Each colour gives an image of the slit in a slightly different position, and to the whole the name "Spectrum" has been assigned. The Spectrum of the Electric Arc was shown to furnish the same series of colours as that of the Sun; and the importance of the presence of these colours was indicated by the effects produced when objects were viewed by the yellow, red, mauve and green lights produced by Sodium, Lithium, Potassium and Barium respectively; the first named gave the features a very ghastly appearance.

These four metals were then volatilized in the cup formed by the lower carbon of the electric light, and the spectra of the incandescent vapours so produced were cast upon the screen.

Each metal produced characteristic lines in various parts of the Spectrum; lines which appear whenever any of the various metals are present, and enable them to be detected with certainty: Sodium showed a bright band of yellow divided by a narrow black line, Lithium red and yellow bands, Potassium red and violet, and Barium green. An indication of the rate of circulation of the blood is furnished by the time taken by Lithium to diffuse through the system, its presence being detected by the characteristic lines produced when liquid containing a trace of it is examined by Spectrum Analysis: Dr. Bence Jones found it in the aqueous humor of the eye a very few minutes after the patient had drunk some Lithia water.

Bunsen when examining some mineral waters by Spectrum Analysis noticed some new lines, attributing them to new metals he proceeded to evaporate 40 tons of the water and from the residue obtained two new metals which he called Caesium and Rubidium. The metals Indium, Gallium and Thallium were discovered in a similar way.

The heavy metals when volatilized give characteristic Spectra in the same manner. The bright lines produced by Iron and Copper were shown. Gases also have definite lines of their own, but the Spectra are too faint to be projected on the screen. The general effect of their incandescence was however shown by passing an electric current through tubes containing various gases in a rarefied state.

Different substances not only yield characteristic Spectra, but also cut off characteristic lines or bands when placed in the path of common light: this is most easily seen in the case of liquids whose purity can often be tested thereby.

The Spectrum of the Sun is crossed by innumerable dark lines and these are found to correspond exactly with the bright lines formed in the Spectra of various metals, whence we conclude that the vapours of these metals exist in the Solar atmosphere and intercept certain definite rays of light passing through it.

The Spectra, and so the composition, of all visible celestial bodies can be studied by the same means.

Want of time here cut the lecturer short.

A vote of thanks to the lecturer was proposed by Mr. Armstrong.

Saturday, July 2nd.

A. C. Deane read the Pender Prize Essay on "The Inhabitants of a drop of water."

The writer began by mentioning that there is a common belief that all water is tenanted by animalculae, but that this is

far from being the truth, since decaying organic matter is necessary for their production. The water of our lakes however contained numbers of these creatures, as was shown by a drop of lake water being thrown on the screen by the oxy-hydrogen microscope. Beginning with the Rotifera, which though of the same size as some Infusoria are immensely superior in organization, various genera and species were described and illustrated, allusion being made to the curious "wheels" with which most of this class are furnished, their use being both as organs of locomotion and, especially in the stationary class, to capture food for their possessor. The curious tube of Melicerta Ringens was then illustrated, and the process of its gradual formation.

Passing to the true Infusoria, the Amoeba was first described, which has as its name implies (from ἀμείβομαι) the power of momentarily changing its shape. Other forms of similarly low organism are the Arcella and Chilodon Cucullus. Various specimens and illustrations of these creatures were shown. The Paramoecium tribe were also described, and the Vorticellae, with their curious method of reproduction by self division. Other classes were mentioned, including the Euglenae and Stylonichia. Some experiments were then described which the writer had made with reference to the capability of Infusoria retaining vitality in extremes of dryness, heat, and cold. Passing to the vegetable kingdom several forms of Diatoms were shown and described. The writer concluded with observing that these were only a few of thousands of forms which are "Inhabitants of a drop of Water."

At the conclusion of the lecture Mr. Carr related the history of the origin of the prize and said that he supposed there was no foundation which had more completely fulfilled the purpose for which it was instituted. The paper which had just been read shewed real scientific work coupled with great interest in the subject.

Saturday, July 16th.

J. W. Marshall, Esq. gave a lecture on "Machines for producing aud utilising electric currents: Dynamos and Motors."

The lecturer commenced by saying that although great progress had been made during the last ten or twelve years, yet machines for producing electric currents were still in their infancy and that in a few years' time those of to-day would probably appear as crude and rudimentary as those of fifteen years ago do to us now. In order to understand the action of those machines it is necessary to know something of electricity and of magnetism. Our first notion of a magnet is that it is something which attracts

iron at a distance, but it is necessary to go further than this and to think of what takes place in the space intermediate between the magnet and the iron.

If a magnet is placed in any position and a small compass moved about near it, it will be found that the compass needle does not always point in the same direction, but that it tends to set itself along certain definite lines which are called "lines of force." If a sheet of paper is laid over a magnet and iron filings sprinkled over it these filings become small magnets and arrange themselves in strings along the lines of force whose directions may thus be demonstrated. It will be found that these lines of force always start from and always end in a magnet, and also that they cluster most closely round the poles of the magnet. It is possible to give a mathematical law for the number of lines of force passing through any space near a magnet, this number giving a measure of the intensity of the magnetic field. Two slides were projected on the screen showing the lines of force for a bar and for a horsehoe magnet; these had been formed by sprinkling the iron filings on to the glass placed over a magnet, and fixing them in the positions they took up.

Electric currents also produce lines of force which have the same properties as those produced by magnets except that they are all closed curves, more or less circular, around the wires which carry the current. Hence magnets and currents act and react upon one another. If a magnet be moved near a circular wire an electric current will be produced in that wire—this is the basis of the action of all dynamos. Also if a magnet be placed near a current flowing through a wire, motion will be induced in the magnet—this principle is the fundamental one in the construction of motors. The laws connecting the direction of the current with the motion of the magnet were stated and illustrated by means of models.

So long as permanent magnets were used in the construction of dynamos only feeble currents were obtained, a great step was made by taking a part of the current produced by the machine and causing that to go round the magnet, thus enormously increasing both the power of the magnet and the intensity of the current. There are several ways of winding the coil or armature in which the current is to be produced the principal of which are known as the Siemens, the Gramme and the Drum armatures. These were illustrated by models and diagrams and the lecture concluded with a series of experiments upon working models which were made to raise weights, light incandescent lamps and do work in other ways. It was also shewn that if a current be passed through the coils of a dynamo these will rotate and the machine may be used as a motor, and conversely, if a motor be made to

rotate, currents will be induced in the coils and the machine becomes a dynamo.

A vote of thanks to the lecturer was proposed by Mr. Goodchild who expressed a hope that some of those who had listened to Mr. Marshall would be induced to make models like those he had shewn.

Saturday, October 8th.

W. H. Ruston Esq. gave a lecture on "Earthquakes."

The increased attention given of late years to the subject, and the invention of very sensitive instruments, have shewn earthquakes to occur much more frequently than was formerly thought to be the case. In Japan for instance, on an average, there are two or three a day, and it is now known that the earth is continually so shaken by tremors that it has been described as "trembling like a jelly." The displacement of the ground during an earthquake is in general very small, and is probably not great even in the case of the most destructive earthquakes, but in this case, the amount of displacement is not accurately known as no very serious shock has yet been recorded by automatic instruments. They originate at comparatively small depths. Mallet assigned a depth of five or six miles to the origin of the Neapolitan earthquake of 1857, and thought that thirty miles was the greatest possible depth of an origin. The most probable causes of earthquakes are (i) Faulting due to the contraction of the earth owing to its gradual cooling; (ii) Sudden outbursts of steam beneath the crust of the earth; (iii) The collapsing of subterranean hollows. Dr. Falb's theory suggests that the interior of the earth is in a fluid state, that the attractions of the sun and moon produce tides in this fluid, which is then forced into cracks into the earth's crust and causes subterranean disturbances. On these suppositions he has predicted earthquakes, occasionally with success, as in the case of the Riviera earthquake of last winter. The theory is open to the objection that there is not the sufficiently marked regularity in the occurrence of these phenomena which should exist if they were due to the causes assigned.

A vote of thanks to the lecturer was proposed by Mr. Williams.

Saturday, October 22nd.

The Rev. The Master gave a lecture on "Aix les Bains and the Grande Chartreuse."

Aix is the French rendering of the Latin "aquæ" or rather

"aquas," and thus the first part of the name of Aix les Bains tells us that its virtues were discovered and employed while Latin was still a spoken language. It was famous under the Empire for its medicinal waters.

There are a few Roman remains in the town, including part of the baths (not as extensive nor as well preserved as those at Bath) and an arch not, as at first sight it seems, triumphal, but a family sepulchral monument erected (probably in the third century) by one Pompeius Campanus in memory of many members of his house.

The use of the waters was probably never lost though much is not heard of them in history. Henri IV of France paid them a visit and was treated there. The present Aix is a very modern town, the revival of its general fame as a place of cure having been recent and rapid. The waters contain a considerable amount of sulphur in hyposulphites and as sulphuretted hydrogen. They are applied in various ways, chiefly by way of douches, both warm, as the water comes from the spring, and cold; they are used also in simple baths and in the forms of spray and vapour. They are most efficacious in cases of Rheumatism and Rheumatic gout, and a large proportion of the visitors shew sufficiently in their crippled walk or otherwise that they have only too good a reason for coming, though of course there is an allowance of amateurs doctoring themselves without much need.

There are two large clubs in which all the amusements of the place, theatre, concert and reading rooms are concentrated. It is to the discredit of the French government that they contain also gambling tables which were suppressed while Savoy was still Italian but have been allowed since its annexation to France.

Aix is the first station on the line to the Mont Cenis tunnel after it leaves the German line at Culoz. South of the lake of Geneva and between the Alps and the Rhone is an oblong space some fifty miles in breadth. The northern part of this space is the old Duchy of Savoy, below it comes the French province of Dauphiné. Aix les Bains is in Savoy, only nine or ten miles from the Rhone, in a side valley filled chiefly by a very pretty lake—the lake of Bourget. It is near the great snowy mountains, hidden from Mont Blanc by a nearer mass, but looking along its own valley on the main chain about the Mont Cenis. The hills immediately about it are of limestone, beautifully green, running with streams of clearest water, covered with firs above, chestnuts and walnuts on the middle slopes, and ending in vineyards, indian corn and vegetation of Italian richness. In all the views the lake is a striking feature, above it is Mont du Chat, and according to Polybius Hannibal must have crossed

this on his way to the Little St. Bernard.

When Louis Napoleon in 1859 commenced his war with Austria he had already come to an understanding with the illustrious Piedmontese statesman, Count Cavour, that as the price of his interference he should be allowed, if the people were willing, to annex Savoy to France. The question was put to the people by a plébiscite and a very large majority voted 'Oui.' It was of some interest to learn 27 years afterwards how feeling stood in the province. So far as could be gathered the great mass of the people are perfectly content. They speak a French not an Italian dialect, their taxes are not heavier than they had begun to be so soon as Piedmont entered on a great policy as the redeemer of Italy, and above all they have not forgotten that they belonged to France for 22 years in the time of the Revolution which gave the land to the peasants. On the other hand the aristocracy, the old families, the men of rank and education, still feel sorely the severance. They dislike France for the same reason that the peasants like it, and they feel in a way that the peasants cannot the painful break with an ancient history and with many personal ties on the other side of the Alps.

Of all the interesting expeditions from Aix the most interesting is that to the Grande Chartreuse. When the Grande Chartreuse was planted in the eleventh century it was 'in the desert,' in the midst of pathless forests, among hills which there was no motive for the ordinary traveller to cross. The name 'le désert' lasts, being still given to what was till the Great Revolution the property of the Abbey and what is now the limit of the weekly walk allowed to the monks—but it is a desert no longer. Three good carriage roads meet within half a mile of the Chartreuse, an electric telegraph runs to within the same distance, huge vans of tourists crowd the road all day in summer. The Chartreuse is looked upon with pride and interest as a national feature, and to this doubtless it has owed, and probably for some time to come will owe, its preservation while other monasteries in France have been suppressed. The tourist sees only glimpses—tantalising glimpses—of the monastic life, but yet enough to assure him that it is no sham, that it is a real survival of the middle ages living on into the unsympathetic glare of the nineteenth century.

The Grande Chartreuse, the parent of the large number of Carthusian monasteries scattered about Western Europe, was founded about the end of the eleventh century by St. Bruno who having been canon and chancellor of Reims was so disgusted by the scandals and inefficiency of the Church that he wished to fly from them into some solitude safer and even more peaceful than an ordinary cloister. From his friend, Hugh Bishop of

Grenoble he obtained the means of gratifying his desire by building a hermitage on a spot a mile above the present Chartreuse. Whatever the origin of the name, which is quite uncertain, it seems to have been carried from St. Bruno's monastery to every monastery that was founded on the same model and in connection with it. The Charterhouse School is so named because it was founded by Sir Thomas Sutton on the site, and partly in the buildings of, a Carthusian monastery in London.

The monastery itself is an enormous pile, but there are only sixty monks; Gray a hundred years ago speaks of them as a hundred, but he probably counted in some of the attendants. They wear white woollen dresses with cowls. The only place where they were seen together was in the Chapel where their midnight service of lauds and matins was very striking. There was no light except a small lamp glimmering before the altar and each monk carried a dark lantern which he used to read by. They have no organ and all seemed to join in the monotonous chanting of endless Psalms. Their day is divided into three portions. They go to bed at 6.30 p.m., rise again at 11 for three hours of prayer in the Chapel and in their cells, then go to bed again till 5.30. Each monk has two little rooms besides a carpenter's shop and a tiny piece of garden. Once a week—on Thursday—they are allowed to take a walk within the limits of the desert, and once a week—on Sunday—they dine in the refectory when some religious book is read aloud, otherwise they take their food in their cells. A monk speaks to no one except by leave of the Superior. Meat is never seen in the monastery, and it is said that in the early days of the order the Chartreuse of Paris sent a deputation to the Pope to ask for a relaxation of this rule so far as to allow of meat being taken when ordered on medical grounds. The parent monastery sent a counter deputation of twenty-seven brethren, and when the Pope asked their ages it was found that the youngest was eighty-seven. Considering this sufficient proof that abstinence from meat was not seriously injurious to life he confirmed the ancient rule. The monks entertain visitors of the male sex hospitably and one of their order is told off to shew them round the monastery at a fixed hour.

The monastery is rich although their lands were taken away at the Great Revolution and never restored. Their source of income is in part the famous Chartreuse liqueur which is made at a large distillery belonging to them about four miles below the Abbey, and in part the monopoly of a plaster which cures all injuries and an elixir which is a specific for most maladies. These together are said to bring in an income of £25,000, and this, according to the testimony of all their neighbours, is spent

chiefly in acts of beneficence.

Two English poets have painted the Chartreuse for us as they saw and felt it. One the scholar poet Gray, a hundred years ago, in some Latin Alcaics written originally in the album of the monastery; the other the scholar poet of our own time, Matthew Arnold. What he saw in the Chartreuse with its silence, its antiquated austerities, its unconsciousness of the movement of the world without, was a parable of the attitude with which some of the noblest spirits of this age, as of every age of change and paroxysm, stand aside, sad but at peace, too full of the old to sympathise at once with the new, too full of the ideal to eat and drink, be glad and busy, as though they were at home in the actual.

A vote of thanks to the lecturer was proposed by Mr. Carr.

Saturday, November 12th.

The Rev. E. Davenport opened a discussion on "Birds" which was maintained by Mr. Penny, Mr. Kempthorne, Mr. Saunder, Mr. Caulfeild, A. P. Greenfield, H. Lyon and others.

Saturday, November 26th.

H. Manders Esq., F.R.C.S. gave a lecture on "Meteors and Comets."

The month of November is peculiarly appropriate to a lecture on meteors since it was by the interpretation of the observations of the November meteors that our knowledge of the nature and paths of meteor swarms was attained.

The appearance known as a shooting star is caused by the passage through the air of a small body weighing perhaps not more than a few grains. The earth is moving with a velocity of 18 miles a second and even if the meteor were stationary the resistance it would experience would be very great, whilst if the meteor is moving to meet the earth the resistance is of course greater. The meteor having its motion thus suddenly checked is rendered very hot and so becomes visible. It has been computed by Dr. Schmidt of Athens that the average number of meteors seen during one hour by one observer on a clear moonless night is 14, from which Professor Newton deduces that not less than 20,000,000 meteors large enough to be seen with the naked eye come into our atmosphere every twenty-four hours; when to these we add those much smaller ones which are seen with telescopes, and which must be at least twenty times as numerous, we find that in 24 hours 400,000,000 meteorites fall to earth.

It was noticed by the old astronomers that great displays of

meteors occurred from time to time in November and within the last few generations it was discovered that the interval between the showers was 33 years. Great displays were observed in 1833 and 1866, and on each occasion it was noticed that the meteors appeared to radiate from a point near the star γ Leonis. From these and other observations Professor Adams was able to shew that the meteors must form a shoal travelling round the sun in an ellipse so long that it takes them 33 years to complete their orbit. The width of this stream cannot be less than 100,000 miles, and its length is so great that although when at perihelion the meteors are travelling at the rate of 26 miles a second, the stream takes about two years to pass the point where its orbit crosses that of the earth. It has been further shewn by Le Verrier that in the year 126 of our era the swarm was almost in contact with Uranus—an enormous planet fifteen times as heavy as the earth—and it is probable that, while previous to this they were moving through space independently of our system, his attraction so affected their path that they have since then remained permanently attached to us.

It is only since the beginning of the present century that the celestial origin of meteorites has been fully recognised by science. The first historical account of a fall is that given by Livy as having occurred on the Alban Mount about B.C. 654; the Chinese have a record of a fall in B.C. 644. The first fall of which the stone was preserved occurred at Ensisheim in Alsace on November 16th, 1492. This Meteorite which weighed 260 lbs. was seen to fall by a child: the main portion of it is kept in the choir of the Church but there is a piece in the British Museum collection at South Kensington. In 1874 Chladni published a treatise on the subject of meteorites and some seven years later a great shower of falling stones occurred at L'Aigle in Normandy the circumstances attending which were investigated by Biot, whose report removed all doubt as to their celestial origin.

Meteorites may be divided into three groups according to the substances which they contain. Those of the first consist almost entirely of iron, those of the second of stone and iron both in large quantity, whilst the third group are almost wholly stone. No new elements have been discovered in meteorites, but the grouping of the elements is such that several minerals have been found in meteoric stones which have never been met with in terrestrial rocks. The iron of meteorites has always been found to be strongly magnetic and hence it might be expected that the greatest deposits of meteoric dust would be found in the neighbourhood of the earth's magnetic poles; a great deal of this cosmic dust has actually been found by Nordenskjöld in the snow of Greenland. It is possible that

Auroras and their accompanying magnetic storms may be caused by showers of this kind.

Norman Lockyer has just brought forward a theory that all celestial bodies larger than meteorites are produced by repeated collisions of meteorites, these collisions sometimes causing a welding together of the masses, sometimes a disruption and dispersion. He supposes that there is a gradual development through the stages of nebulæ, comets and more brilliant stars to older stars and finally to dead worlds such as the moon. He further sees no reason why these dead worlds should not collide, be broken up and dispersed through space to fall as meteorites on globes such as ours.

It has been suggested that the large meteorites may have been shot out from the moon or some planet near us. A more probable theory is that they come from the sun, being thrown out in those mighty storms of which we have evidence in sun spots and prominences.

In 1866 Schiaparelli worked out the orbit of a comet which appeared in that year, and to his astonishment found it identical with that which Professor Adams had obtained for the November meteor stream. Since then it has been ascertained that the orbits of many meteoric streams are identical with those of comets, and the conclusion is forced upon us that comets are nothing but meteoric swarms becoming visible to us partly by their own light, partly by that of the sun. When near perihelion, some action, possibly electrical, causes streams of gas to rush away from the nucleus in a direction opposite to that of the sun, thus forming the tail.

The lecturer concluded by shewing, with brief descriptions, a series of admirable views of comets, many of the slides having been painted by himself, including all the most remarkable comets of the present century. Want of time however prevented his entering so fully into this part of his subject as his audience would have liked.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, December 10th.

The Rev. F. J. Tuck gave a lecture on "Norway."

The lecturer disclaimed any intention of giving a geographical account of the country, but only wished to exhibit a number of slides with characteristic views of Norwegian scenery which might recall pleasant memories to those who had been there, and might induce those who had never visited the country to go and see for themselves. For the slides he was greatly indebted

to Dr. Fairbank of Windsor, with whom the lecturer had made one of his tours, and who, as an amateur, had ventured farther than any professional photographer.

Norway, though only 750 miles in length, has a coast line of 1,250 miles; it slopes up from Sweden to a plateau 4,000 ft. high on the West, where the coast is deeply indented by Fjords. The usual route to Norway is from Hull or Newcastle to Bergen, by which the lecturer went in a fine steamer, the Eldorado. It is best to go early in the year, because in the summer and autumn the place is spoilt by tourists. The expenses depend, of course, on the mode of travelling, but, in any case, living is cheaper than in England. There are five classes of accommodation to choose during a tour. The principal Hotels, which are very expensive; Stations, containing about 50 beds, which are very comfortable; smaller stations, with 10 or 12 beds; Gaards, or farm houses, which are made of wood, but where one is well looked after; and lastly Saeters, the huts of the peasantry, which consist of two rooms, a bed room, and a kitchen, dining, sitting and store room in one: these last are what the climbers generally use before an ascent. The inhabitants are simple, honest and obliging but rather slow, and are occupied largely in farming. Some views of Bergen were then shown, including the entry into the harbour, and the market-place: next a view of Fleischer's hotel at Vossevangen where the Prince of Wales stayed during his trip to Norway, and Vossevangen Church. Next came views of Stalheim and the Naerodal; then some of Laera and of Borgund Church. Then a series of views of the Jotunheim including the two highest mountains in Norway, ending up with Marifjaeren on the Sogne Fjord, were shown, their number preventing the lecturer from entering into details in the time at his disposal. Two different kinds of Norwegian spoons, kindly lent by Mr. Kempthorne, were also exhibited.

Mr. Davenport proposed a vote of thanks to the lecturer and to Dr. Fairbank who had so kindly allowed his slides, 58 in all, to be exhibited.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Wednesday, February 2nd.

At a P.B.M., P. B. Norris was elected Secretary.

P. B. Norris resigned the office of Botanical and Entomological Album Keeper, and a vote of thanks was passed to him.

J. C. V. Durell resigned the office of Meteorological Album Keeper, and a vote of thanks was carried.

H. B. de V. Wilkinson was elected Entomological Album Keeper.

J. W. Williams and A. B. Ward were elected to serve on the Committee for the term.

E. P. Stracey, A. A. Stracey, H. à C. Pigott, S. L. L. Scarlett, I. D. Mackenzie, G. H. Goldfinch, R. A. Birley, J. A. S. Murray, G. C. Brooke were elected Associates.

At a Committee Meeting, A. L. Hine-Haycock, F. S. Goldingham, A. Lyon, R. Sparrow, F. H. Smith were elected Members.

Monday, February 7th.

At a P.B.M., G. Whitfield, G. F. Berkeley, G. J. Mordaunt, A. D. Schofield, J. P. Reid, H. Vandeleur, E. H. Llewellyn, T. S. Simson, C. C. Bethune, F. H. Wolley Dod, Baron G. W. E. E. Zedlitz, H. A. Cruickshank, S. Clay, F. E. Easton, W. H. Bunbury, W. A. Payn, C. C. Blackburne-Tew, A. R. Best, O. T. Webber were elected Associates.

A. J. V. Durell was elected Meteorological Album Keeper, A. D. Schofield, Botanical Album Keeper, A. Lyon Ethnological Album Keeper.

Thursday, May 12th.

At a P.B.M., N. F. E. G. Way, E. F. Lance, G. L. Busk were elected Associates.

L. F. S. Hore was elected Botanical Album Keeper.

V. L. Johnstone and A. B. Ward were elected to serve on the Committee for the term.

At a Committee Meeting L. F. S. Hore, A. C. Deane, S. T. Hankey were elected Members.

V. L. Johnstone and P. B. Norris were elected Judges for the Pender Prize.

R. H. Whitcombe Esq., E. F. Elton Esq., H. M. Burge Esq., were elected Honorary Members.

Thursday, June 10th.

At a P.B.M., E. W. Denny, A. E. C. Myers, R. Oakley, F. N. Reckitt, H. C. Chaworth Musters, C. Waterer, W. T. Willett were elected Associates.

Monday, July 25th.

At a P.B.M., P. B. Norris resigned the Secretaryship, and a vote of thanks was passed to him.

J. C. V. Durell resigned the office of Treasurer, and a vote of thanks was carried.

A. J. V. Durell resigned the office of Meteorological Album Keeper, and a vote of thanks was passed.

H. A. Cruickshank was elected Secretary, A. C. Deane Treasurer, G. Whitfield Meteorological Album Keeper.

Saturday, October 8th.

At a P.B.M., E. A. Brackenbury, P. G. Stewart, W. R. P. Stapleton Cotton, F. M. Lane, W. Sanger, E. B. Macnaghten, R. H. Tahourdin, were elected Associates.

A. B. Ward, J. C. V. Durell were elected to serve on the Committee for the term.

A. H. Fox-Strangways Esq., and C. R. Carter Esq. were elected Honorary Members.

PRIZES.

A prize of the value of £5 is given annually by Lady Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition:

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the Pesident not later than the second Saturday in the Easter term with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognized by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That preference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays one on some branch of Physics and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but

should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1887 was awarded to A. C. Deane for an essay on "The inhabitants of a drop of water."

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

The prizes for 1887 were awarded to J. E. Hales and R. Sparrow: additional prizes were given by Mr. Penny to H. B. de V. Wilkinson and E. P. Stracey.

PHENOLOGICAL REPORT.

The following observations have been made of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list.

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &c.)

1	**Anemone nemorosa** (Wood Anemone)	May	15
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)		
3	*Ranunculus acris* (Upright Crowfoot)	May	14
4	**Caltha palustris** (Marsh Marigold)	May	14
5	*Papaver Rhœas* (Red Poppy)	June	21
6	*Nasturtium officinale* (Water Cress)		
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)		
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)	May	23
9	*Draba Verna* (Whitlow Grass)	Mar.	10
10	*Viola odorata* (Sweet Violet)		
11	*Polygala vulgaris* (Milkwort)	May	12
12	*Lychnis Flos-cuculi* (Ragged Robin)	June	17
13	*Stellaria Holostea* (Greater Stitchwort)		
14	**Malva sylvestris** (Common Mallow)	June	28
15	*Hypericum tetrapterum* (Square St. John's Wort)		
16	,, *pulchrum* (Upright St. John's Wort)		
17	**Geranium Robertianum** (Herb Robert)		
18	*Euonymus europæus* (Spindle Tree)		
19	*Acer Pseudo-platanus* (Sycamore)	May	30
20	*Æsculus Hippocastanum* (Horse Chesnut)		
21	*Cytisus Laburnum* (Laburnum)		
22	**Trifolium repens** (Dutch Clover)	June	1
23	*Lotus corniculatus* (Bird's Foot Trefoil)	June	2
24	*Vicia Cracca* (Tufted Vetch)	June	1
25	,, *sepium* (Bush Vetch)	June	2
26	*Lathyrus pratensis* (Meadow Vetchling)	June	23
27	**Prunus spinosa** (Sloe, or Black-thorn)	May	14
28	*Spiræa Ulmaria* (Meadow Sweet)		
29	*Potentilla anserina* (Silver-weed)	June	16
30	*Rosa canina* (Dog Rose)	June	17
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)		
32	*Cratægus Oxyacantha* (Hawthorn)		
33	*Epilobium hirsutum* (Great Hairy Willow-herb)		
34	,, *montanum* (Broad Willow-herb)	July	2
35	*Angelica sylvestris* (Wild Angelica)		
36	*Daucus Carota* (Wild Carrot)		
37	**Hedera Helix** (Ivy)		
38	*Cornus sanguinea* (Dog-Wood)		
39	*Syringa vulgaris* (Lilac)		
40	*Galium Aparine* (Cleavers)	June	1
41	,, *verum* (Yellow Bedstraw)		
42	*Dipsacus sylvestris* (Wild Teasel)		

43	*Scabiosa succisa* (Devil's-bit)	July 21
44	*Petasites vulgaris* (Butter-bur)	
45	**Tussilago Farfara** (Coltsfoot)	
46	**Achillea Millefolium** (Milfoil, or Yarrow)	June 1
47	*Chrysanthemum Leucanthemum* (Ox-eye)	June 21
48	*Artemisia vulgaris* (Mugwort)	
49	*Senecio Jacobæa* (Ragwort	June
50	**Centaurea nigra** (Black Knap-weed)	
51	*Carduus lanceolatus* (Spear Thistle)	
52	,, *arvensis* (Field Thistle)	
53	*Sonchus arvensis* (Corn Sow Thistle)	
54	*Hieracium Pilosella* (Mouse-ear or Hawk-weed)	
55	**Campanula rotundifolia** (Hair-bell)	July 2
56	*Ligustrum vulgare* (Privet)	
57	**Convolvulus sepium** (Greater Bind-weed)	July 7
58	*Symphytum officinale* (Comfrey)	
59	*Pedicularis sylvatica* (Red Rattle)	June 6
60	*Veronica Chamædrys* (Germander Speedwell)	May 14
61	*Mentha aquatica* (Water Mint)	
62	*Thymus Serpyllum* (Wild Thyme)	July 18
63	*Prunella vulgaris* (Self-heal)	
64	*Nepeta Glechoma* (Ground Ivy)	May 14
65	*Galeopsis Tetrahit* (Hemp-nettle)	
66	*Stachys sylvatica* (Hedge Woundwort)	June 12
67	*Ajuga reptans* (Bugle)	June 1
68	**Primula veris** (Cowslip)	May 12
69	*Plantago lanceolata* (Ribwort Plantain)	
70	*Mercurialis perennis* (Dog's Mercury)	Mar. 16
71	*Ulmus montana* (Wych Elm)	
72	*Salix Caprea* (Great Sallow)	
73	*Fagus sylvatica* (Beech)	
74	*Corylus Avellana* (Hazel)	
75	*Orchis maculata* (Spotted Orchis)	June 18
76	*Iris Pseud-acorus* (Yellow Iris)	
77	*Narcissus Pseudo-narcissus* (Daffodil)	Mar. 28
78	*Galanthus nivalis* (Snowdrop)	
79	**Scilla nutans** (Blue-bell)	May 27

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY).

80 *Melolontha vulgaris* (Cock Chafer, or May Bug)
81 *Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)
82 *Timarcha lævigata* (Bloody-nose Beetle)
83 *Lampyris noctiluca* (Glow-worm)
84 *Apis mellifica* (Honey Bee, or Common Hive Bee)
85 *Vespa vulgaris* (Wasp)
86 *Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)
87 ,, *Rapæ* (Small Garden White or Cabbage Butterfly)
88 *Anthocharis Cardamines* (Orange-tip Butterfly)
89 *Epinephile Janira* (Meadow-brown Butterfly)
90 *Bibio Marci* (St. Mark's Fly)

BIRDS.

(ARRIVAL ; SONG ; NESTING ; FIRST EGG.)

91	*Strix aluco* (Brown Owl)	
92	*Muscicapa grisola* (Flycatcher)	arr. May 8
93	*Turdus musicus* (Song Thrush)	sg. Jan. 28, Nov. 13.
94	„ *pilaris* (Fieldfare)	
95	*Daulias luscinia* (Nightingale)	sg. May 12
96	*Saxicola œnanthe* (Wheatear)	
97	*Phylloscopus trochilus* (Willow Wren)	
98	„ *collybita* (Chiff chaff)	
99	*Alauda arvensis* (Sky-lark)	sg. Feb. 28
100	*Fringilla cœlebs* (Chaffinch)	sg. Jan. 29
101	*Corvus frugilegus* (Rook)	nesting Mar. 19
102	*Cuculus canorus* (Cuckoo)	arr. & sg. April 24
103	*Hirundo rustica* (Swallow, or Chimney Swallow)	arr. April 12, last seen Oct. 16.
104	„ *urbica* (House Martin)	
105	„ *rivaria* (Sand-Martin)	
106	*Cypselus apus* (Swift)	arr. May 12
107	*Caprimulgus europœus* (Goatsucker, or Fern-owl)	
108	*Columba turtur* (Turtle Dove)	sg. May 8
109	*Perdix cinerea* (Partridge)	
110	*Scolopax rusticola* (Woodcock)	
111	*Crex pratensis* (Corncrake, or Land Rail)	

MISCELLANEOUS.

(FIRST APPEARANCE.)

112 Frog Spawn

METEOROLOGICAL REPORT.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1	30·39		11·9	73·2				10		N.
2	30·23	37·8	12·2	59·3	13·5			6	·13	N.W.
3	29·80	45·9	13.5	54·5	37·8	37·6	98	10	·77	S.
4	29·38	34·7	29·8	44·0	30·7			10	·27	N.E.
5	28.88	38·3	23·9	84·1	33·9	33·7	98	10	·03	S.W.
6	28·91	34·4	29·4	46·7	31·8	31·5	95	10	trace	W.
7	29·04	37·6	26·1	65·3	30·7	30·5	96	8	·32	S.E.
8	·11	36·5	29·8	73·8	32·8	31·6	84	9	·03	S.W.
9	·31	33·2	26·9		31·0	30·9	96	10	·01	S.
10	·83	38·2	26·7	76·9	27·5	27·2	93	8	·03	W.
11	29·88	40·1	26·9	44·6	36·5	35·5	91	10	·10	S.E.
12	30·27	39·1	35·8	68·3	36·3	35·7	95	10		N.
13	·47	31·3	20·0	41·2	28·7	28·6	97	10		N.E.
14	·23	32·8	25·2	46·1	27·0	27·0	100	10	trace	N.
15	·31	31·3	27·5	37·0	31·2	29·2	75	10		N.E.
16	·07	28·6	28·1	38·2	27·9	26·8	78	10	trace	N.
17	·10	37·2	15·0	55·6	17.0	16·9	95	1	·05	E.
18	·00	45·7	17·5	53·0	37·0	36·9	98	10	·05	S.
19	·12	50·8	37·8	47·5	44·8	44·6	98	9	·25	S.
20	·36	46·2	36·1	75·9	37·1	35·7	87	0		N.W.
21	·58	41·5	31·0	66·9	34·0	33·8	98	10		N.W.
22	·48	47·6	36·6	46·1	40·8	39·2	87	9	·01	N.W.
23	·45	47·8		45·4	38·4	37·1	89	10		S.W.
24	·21	42·3		53·0	35·8	34·7	90	10		N.W.
25	·14	49·5		79·1	39·1	38·8	97	10	trace	N.E.
26	·23	50·9	36·5	85·3	39·8	38·9	93	7	trace	S.E.
27	·29	50·9	36·5	49·2	31·8	31·8	100	10	·01	S.
28	·31	49.4	31·3	58·2	43·0	42·9	99	10	trace	S.
29	·33	48·6	42·9	54·0	46·0	45·7	98	10		S.W.
30	·25	46·7	30·3	54·0	31·8	31·5	95	10		S.E.
31	30·03	52·8	30·8	86·3	46·8	45·5	91	8	trace	S.E.
Mean	30·00	41·6	27·7	58·8	34·0	34·3	84	8·5	Total 2·06	

FEBRUARY.

Date	Barom. Reduced.	Thermomometers. Max.	Min.	Solar Max.	Dry Bulb	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·71	52·5	41·2	51·2	48·9	47·1	87	10	·09	S.W.
2	·99	52·6	28·1	85·3	32·9	32·0	87	5	·11	S.E.
3	29·89	52·2	32·4	88·1	49·2	45·9	78	8	·04	S.W.
4		50·7	48·3	81·1	49·4	49·0	97	10		S.W.
5		55·9	40·7	89·3	43·1	43·0	99	5		S.W.
6	30·59	55·8	27·3	89·5	32·2	31·6	92	0		N.E.
7	·66	56·1	26·2	47·0	30·3	29·6	88	10		N.E.
8		53·0	24·4	81·4	30·1	28·7	77	0		E.
9	·50	52·7	25·2	63·8	31·7	30·0	78	10		E.
10		39·1	24·9	78·6	30·0	27·8	67	8		E.
11	·31	37·9	29·6	80·2	32·9	29·9	68	10	trace	N.
12	·39	41·8	30·3	84·0	34·2	32·3	80	9	trace	E.
13	·37	39·1	30·5	81·4	34·3	32·3	79	10		N.E.
14	·17	37·0	29·0	56·0	31·7	30·3	82	10		N.E.
15	·25	37·3	28·9	41·9	35·9	33·9	82	10		N.
16	·37	36·0	22·6	73·4	24·9	24·2	82	3		N.E.
17	·36	45·0	16·5	84·3	19·3	19·1	93	4	·17	N.E.
18	·97	44·4	20·2	56·8	36·9	36·8	99	10	·10	N.
19	·13	43·0	37·8	80·5	37·7	36·7	91	6	trace	N.
20	30·11	42·8	36·8	54·2	48·1	47·3	94	10	·17	N.
21	29·98	46·3	38·7	88·3	38·9	38·7	98	9	trace	N.W.
22	30·07	47·4	32·5	64·1	34·1	34·0	99	8	·01	N.W.
23	·07	49·2	35·5	83·5	45·7	45·1	96	10	trace	S.W.
24	30·03	49·4	44·7	91·3	45·4	42·7	81	7	·02	S.W.
25	29·98	50·8	44·8	101·0	44·9	43·2	88	3		S.W.
26	30·43	51·0	25·0	101·1	34·1	32·6	84	0		W.
27	·59	52·8	22·5	95·3	31·1	31·1	89	0		S.
28	30·59	52·5	21·3	91·6	26·9	26·9	100	7		N.
Mean	30·27	47·3	30·9	77·3	36·3	35·1	87	6·9	Total ·71	

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/°	0—10	In.	
1	30·50	42·3	26·2	80·5	32·5	32·4	99	10		N.W.
2	·65	44·8	22·3	89·6	30·1	29·6	92	6		S.E.
3	·51	49·4	23·3	84·7	31·7	31·3	94	10		S.E.
4	·41	40·3	24·0	67·2	27·6	27·4	95	10	·01	N.E.
5	·22	38·3	26·9	45.4	32·9	32·8	99	10	trace	N.E.
6	·10	48·7	32·0	66 2	31·9	31·7	97	10	trace	S.E.
7	·19	41·7	32·8	53·3	35·5	33·6	83	10		E.
8	30·10	40·0	35·4	47·9	38·9	36·8	82	10		N.E.
9	29·98	41·0	34·5	59·9	35·9	33·9	82	10		N.W.
10	30·02	45·8	32·9	84·0	35·7	35·1	95	10	trace	N.W.
11	29·97	48·6	32.5	91·5	39·1	38·9	98	8	·30	N.
12	29·70	40·0	33·5	85·0	33·9	33·4	95	10	trace	N.W.
13	30·08	39·4	18·3	89·4	29·9	28·0	70	2		N.
14	29·92	31·4	18·5	93·6	25·2	24·8	89	0	·01	N.
15	·74	33·3	25·3	49·8	31·9	31·4	93	10	·51	E.
16	29·84	35·3	27·6	55.4	28·5	28·3	95	10		N.W.
17	30·03	35·3	15·6	99·3	23·0	22·7	91	2	trace	N.W.
18	·12	37·0	22·7	101·7	27·9	27·6	93	2		N.
19	·22	38·7	15·8	91·2	28·1	27·8	93	1	trace	S.W.
20	30·03	36·5	26·4	88·7	30·4	29·4	83	10		E.
21	29·81	43·9	24·6	85·0	30·2	29·3	84	9	·07	S.
22	·34	53·1	29·6	102·[illegible]	43·8	42·5	90	10	·24	W.
23	·04	50·8	42·2	119·2	44·3	44·2	99	10	trace	W.
24	·58	49·4	35·8	84·7	45·3	45·2	99	7	·13	S.W.
25	29·56	50·9	35·7	87·7	41·9	41·9	100	4	·15	W.
26	30·03	52·1	38·9	97·2	45·9	45·7	99	1	·12	N.W.
27	29·89	56·9	44·4	104·9	46·6	45·9	95	10	·01	W.
28	30·05	54·4	37·7	99·8	45·7			8		N.W.
29	·25	54·8	35·5	100·6	46·8			2		N.
30	·25	52·8	33·6	104·0	45·1	43·8	90	7		N.W.
31	30·10	52·3	40·5	79·0	46·4	42·7	75	10	·19	N.W.
Mean	30.01	44·5	29·9	83·5	35·9	34·4	91	7·4	Total 1·74	

APRIL.

Date	Barom. Reduced	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	29·50	47·8	33·1	94·6	37·3	37.1	98	10	·20	N.
2	29·84	54·5	30·8	92·3	40·9	39·6	90	7	trace	N.
3	30·06	55·8	33·1	91·6	40·9	40·0	93	10		N.
4	29·78	55·8	33·3	102·0	44·0	40·9	78	5	·01	W.
5	·45	42·2	33·2	84·2	38·2	38·0	98	10	·07	N.
6	·73	44·6	34·2	116·0	41·8	37·9	72	7		N.
7	29·88	50·9	34·4	136·6	42·9	37·6	64	2		N.
8	30·07	51·8	32·3	98·3	43·7	38·2	63	2		N.
9	·11	51·7	32·5	87·0	40·0	38·0	84	9		N.
10	·20	51·6	36·4	78·2	38·4	37·0	88	10		N.E.
11	30·10	58·2	32·8	100·7	40·8	39·6	90	10		N.E.
12	29·99	61·9	33·9	104·5	42·1	40·0	84	10		E.
13	30·05	56·6	36·5	98·1	43·0	39·4	73	10		N.E.
14	·18	53·8	30·9	102·2	39·6	34·7	64	7		N.
15		52·9	23·3	97·4	39·8	35·6	68	7		N.
16	·51	51·5	32·3	95·2	44·7	38·6	60	7		N.E.
17	·66	51·5	22·6	98·2	43·2	38·1	65	2		N.E.
18	·49	61·7	27·9	103·8	48·7	43·0	64	0		N.
19	·30	65·8	37·7	115·1	55·9	46·9	52	3		N.
20	30·15	63·6	34·4	106·4	51·9	46·8	69	0		N.
21	29·93	61·6	35·0	109·2	48·9	45·5	77	4	trace	S.W.
22	29·60	60·5	43·7	101·4	53·1	48·6	72	7	·04	S.W.
23	•	56·7	44·3	108·1	49·9	46·0	75	4	·20	S.W.
24		53·8	39·1	104·1	40·3	40·3	100	8	·07	N.
25		48·9	39·1	89·1	41·1	40·8	98	10	·01	W.
26	29·91	50·8	33·3	100·0	45·1	41·3	74	8	·27	S.W.
27	·86	49·7	35·4	110·6	44·4	40·7	74	4	·11	W.
28	·98	54·8	32·4	110·5	46·0	43·0	79	4	·19	W.
29	29·87	52·5	37·3	98·3	40·9	40·0	93	10	trace	N.W.
30	30·06	52·5	40·2	94·1	43·9	41·2	80	10		N.E.
Mean	30·01	54·2	34·2	100·9	43·7	38·8	75	6·6	Total 1·17	

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/°	0—10	In.	
1	30·05	51·4	31·1	94·2	47·6	43·3	72	7	·01	E.
2	29·59	48·8	39·4	87·8	44·7	43·4	90	10	·05	N.E.
3	·51	57·9	43·0	104·7	47·2	47·2	100	10	·09	N.E.
4	·50	52·4	40·4	98·7	47·3	45·5	87	10	·10	N.E.
5	·71	61·3	44·2	103·7	48·1	46·7	90	9	trace	S.
6	29·84	49·7	42·4	62·8	46·7	45·4	91	10	·31	E.
7	30·07	58·5	43·4	106·5	45·9	44.7	92	10	·01	W.
8	·35	68·6	40·1	82·7	57·5	53·0	74	1		S.
9	·29	64·7	46·3	114·8	54·2	51·2	80	8		N.
10	·32	63·9	36·4	112·4	53·9	49·5	72	0		N.E.
11	·19	56·5	41·5	91·1	54·7	53·3	90	10	·02	N.E.
12	·05	58·6	50·1	95·7	51·9	50·8	93	10		N.E.
13	·16	49·8	41·7	106·5	43·9	40·9	78	4	·01	N.
14	·28	55·4	37·4	104·4	45·9	42·7	78	4		N.E.
15	·27	60·2	30·1	87·3	48·9	45·4	77	0		N.
16	30·12	60·1	43·6	105·0	50·7	48·2	83	7		N.
17	29·96	56·7	43·9	139·1	48·9	47·0	87	10		N.
18	·83	57·5	47·7	88·3	51·8	51·0	94	10	·03	N.W.
19	·82	60·7	42·4	103·5	47·8	47·1	96	10	·21	W.
20	·34	50·1	42·9	100·4	45·7	43·4	84	8	·03	W.
21	·71	51·1	36·0	101·0	47·9	45·8	86	5	·20	W.
22	·76	52·9	36·5	104·4	44·7	44·7	100	10	·03	W.
23	29·99	59·0	35·4	112·8	47·7	46·1	89	3	trace	N.W.
24	30·13	60·0	43·2	104·0	53·9	51·8	86	4	·06	N.W.
25	·23	55·1	42·9	100·8	46·8	45·9	93	10	trace	N.W.
26	30·07	84·1	43·8	107·3	51·2	49·7	90	4	·16	N.E.
27	29·93	50·8	43·5	65·4	44·1	44·1	100	10	·10	N.
28	·85	57·8	43·5	90·6	50·5	49·5	93	10		N.
29	·86	50·8	43·4	80·9	47·2	40·1	67	10	·07	N.E.
30	29·91	57·3	45·2	77·7	47·4	47·4	100	10	trace	N.E.
31	30·02	67·1	46·9	116·2	52·9	52·6	98	10	·03	N.E.
Mean	29·96	57·7	41·6	98·4	49·0	47.0	87	7·5	Total 1·52	

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°		°	°	%	0—10	In.	
1	29·87	61·5	45·7	92·3	53·1	52·1	93	10		E.
2	·69	52·8	46·4	63·3	49·5	49·0	97	10	.88	E.
3	·57	53·8	48·6	95·9	49·9	49·9	100	10	·49	N.
4	29·85	66·4	45·7	109·3	53·2	52·8	97	2	trace	W.
5	30·04	67·0	48·1	122·6	58·5	54·5	76	6		W.
6	30·06	64·2	52·0	100·0	56·7	55·9	94	10		W.
7	29·97	67·5	52·0	109·1	58·1	57·5	96	10		S.W
8	29·97	70·6	54·7	102·9	59·9	58·9	94	10		S.W.
9	30·10	68·9	45·7	115·6	59·7	55·9	77	2		S.W.
10	·28	67·2	44·9	118·8	57·7	53·9	77	3		N.W
11	·35	72·0	41·4	120·4	60·7	56·3	74	3		S.W.
12	·12	73·5	48·3	127·4	64·1	63·4	96	7		S.W.
13	·09	78·4	47·6	123·1	64·6	60·1	75	0		N.W.
14	·16	79·9	50·8	124·0	68·5	58·7	53	1		N.W.
15	·24	82·7	50·2	123·5	70·1	69·8	99	1		W.
16	·26	77·5	50·8	118·9	68·4	64·6	79	2		W.
17	·26	72·9	50·9	87·0	66·1	61·9	77	2		N.E.
18	·21	76·2	49·3	115·8	53·9	53·8	99	3		E.
19	·17	78·4	47·4	123·3	71·7	65·4	69	2		E.
20	·26	69·5	52·1	113·4	58·1	55·5	83	3		N.E.
21	·30	69·9	39·7	133·3	56·6	52·2	73	1		N.E.
22	·23	69·2	45·2	114·8	54·8	51·2	76	4		N.E.
23	·17	74·5	50·2	120·0	59·9	56·9	82	1		N.
24	·20	64·3	48·6	114·5	54·4	53·7	95	10		N.E.
25	·19	66·3	50·0	118·2	51·9	51·8	99	10		N.E.
26	·19	60·5	46·0	122·8	52·9	51·8	93	10		N·E.
27	·15	81·6	42·0	123·3	60·0	57·4	84	0		N.E.
28	·17	70·9	51·5	119·3	58·7	56·9	88	10		N.W.
29	·32	73·3	57·2	123·5	62·1	59·7	86	7		
30	30.37	66·6	51·1	111·6	61·1	59·1	88	7		W.
Mean	30·13	69·9	48·3	113.6	59·2	56·7	82	5·2	Total 1.37	

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·27	75·5	44·1	118·4	64·9	60·9	77	0		N.W.
2	·20	82·9	49·3	133·1	71·9	66·4	72	0		S.W.
3	30·15	84·5	53·7	135·1	74·9	68·7	69	0		W.
4	29·95	84·9	54·2	129·8	73·1	67·3	75	3	.05	S.W.
5	29·89	61·9	53·3	122·0	58·1	57·7	97	10		N.
6	30·09	70·9	44·7	125·6	58·8	57·7	93	2		W.
7	30·07	78·9	55·3	134·3	67·5	66·9	96	2		S.W.
8	29·98	81·8	51·0	127·3	71·0	69·6	92	1		S.W.
9	·87	73·4	60·1	125·1	61·8	60·7	94	6	·01	S.
10	·72	75·0	55·6	130·8	67·7	67·3	98	4	·14	W.
11	·85	75·5	58·3	123·6	62·6			10		S.W.
12	·80	71·9	59·3	121·3	64·9	64·1	95	9		W.
13	·74	76·1	54·9	123·3	71·4	70·1	93	2		S.W.
14	29·92	71·2	57·3	101·9	63·7	63·1	96	10		S.W.
15	30·07	73·8	51·8	130·8	63·1	60·9	87	7	·06	S.W.
16	·13	72·9	50·7	123·2	61·2	60·4	95	1		S.W.
17	·16	68·8	48·4	122·2	61·1	59·9	93	6		N.W.
18	·20	68·6	37·8	119·9	56·0	55·8	99	0		N.
19	·21	73·6	41·4	126·6	56·1	55·3	94	0		N.
20	·24	76·7	48·7	125·0	59·5	58·0	91	10		N.W.
21	·20	74·7	50·5	116·1	60·0	59·2	95	8		N.
22	·03	76·0	44·8	117·3	60·7	58·5	87	0		W.
23	30·13	77·9	47·9	124·6	63·5			2		W.
24	29·93	77·0	50·2	128·6	64·4			9	·24	S.W.
25	·79	75·0	58·2	123·5	58·7			10		W.
26	·70	72·7	52·0	116·3	59·4			2	·25	S.W.
27	29·73	72·0	58·3	126·5	64·4			8		S.
28	30·20	71·7	53·3	122·3	66·3			6		S.W.
29	·02	67·8	55·1	114·1	66·0			10	·03	S.W.
30	·16	71·2	47·6	123·6	62·9			4		S.
31	30·07	72·9	48·7	120·9	59·7			9		N.W.
Mean	30·01	74·1	51·5	123·6	63·7	62·3	89	4.8	Total ·78	

AUGUST.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·21	74·0	44·5	110·3	63.7	55·5	58	1		N.W.
2	29·99	72·7	44·2	127·1	64·7	55·9	57	0		N.W.
3	30·31	84·7	41·0	120·7	61·9	55·8	67	0		N.W.
4	·30	75·0	42·8	120·6	65·6	56·1	54	0		S.E.
5	·18	76·1	45·6	119·5	67·1	57·6	54	0		E.
6	·07	84·9	49·1	128·3	72·1	62·0	54	1		S.
7	·03	79·5	52·5	132·5	73·2	62·5	53	3		S.
8	·19	84·2	45·4	128·7	72·1			5		S.W.
9	·14	78·9	53·0	123·7	68·0			0		N.W.
10	·07	70·8	54·7	114·9	60·6			3		N.
11	30·04	67·0	51·8	119·3	57·5			10		N.
12	29·94	68·9	48·1	116·1	57·0			9		N.
13	·76	66·1	49·5	115·9	56·3			10	·01	N.W.
14	·94	65·1	49·6	113·6	55·5			5		N.W.
15	·98	70·1	36·3	118·7	62·0			1	·01	S.E.
16	·73	63·9	50·4	73·3	55·9			10	·40	N.E.
17	·74	64·9	51·6	112·6	54·3			10	·18	S.E
18		64·0	50·8	111·3	56·6			6		N.
19	·91	66·1	44·2	110·4	58·0			5	·22	N.
20	29·83	62·8	44·9	101·9	53·9			9		N.
21	30·04	69·2	43·0	116·1	56·9			6		N.E.
22	.04	73·2	44·3	116·7	63·7			4		S.E.
23	30·04	74·1	45·9	120·5	64·3			2		S.E.
24	29·94	78·1	47·7	120·1	68·3			4		S.
25	·85	81·5	48·9	128·0	67·2			9		S.
26	·72	71·6	51·2	101·7	64·5			10	·01	S.
27	·75	71·0	55·5	120·1	60·4			10		S.
28	·69	74·9	58·3	120·7	63·1			10	·02	S.E.
29	·61	71·9	55·2	118·1	63·1			8		S.W.
30	·68	69·5	57·7	116·3	63·1			5	1·14	N.W.
31	29·45	66·9	54·9	114·5	60·4			6	·13	S.W.
Mean	29.93	72·3	48·7	116·5	62·2	59·9	59	5·2	Total 2·12	

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1	29·64	63·7	54·0	89·2	60·8			10	·43	S.
2	·24	63·8	55·0	114·1	57·5			10	·06	S.W.
3	·77	64·7	52·0	109·5	60·3			6	·60	S.W.
4	·65	65·5	52·5	108·8	59·1			6	·03	N.W.
5	·51	66·8	53·0	98·2	56·6			10	·02	S.W.
6	·53	67·5	54·0	117·1	59·9			7	·07	S.
7	29·57	62·9	51·0	110·8	58·3			5	·14	S.
8	30·32	63·1	35·7	106·6	53·9			2		N.W.
9	30·16	66·1	42·6	110·2	57·0			10	·06	S.W.
10	29·94	61·6	50·8	111·3	55·6			9		N.E.
11	·87	65·1	43·2	107·3	56·0			8	·01	W.
12	·70	61·1	48·1	109·5	51·9			10	·01	N.E.
13	·74	57·1	42·5	106·6	48·9			6		N.W.
14	·85	60·9	40·2	110·3	53·9			4		N.W.
15	29·89	60·8	44·0	98·6	51·7			10	·09	S.W.
16	30·03	62·5	47·3	105·4	55·4			8	·49	W.
17	·03	60·6	53·6	91·7	55·4			10	·04	S.
18	·27	61·1	45·0	108·1	51·7			5		N.
19	·40	60·2	44·7	109·3	53·9			4		N.
20	·26	64·1	41·2	105·8	55·1			6		N.E.
21	·27	64·2	49·1	94·7	52·5			6		N.E.
22	·24	64·7	46·4	107·1	55·7			7		N.
23	·34	61·1	37·0	93·1	50·3			10		N.
24	·40	61·0	46·1	83·5	51·0			8		N.E.
25	30·37	61·2	34·8	102·0	49·2			10		N.
26	29·82	58·9	49·0	92·3	54.3			10	·18	N.W.
27	·43	58·5	45·1	105·8	51·8	49·8	86	1	trace	W.
28	·26	55·3	33·3	108·1	44·4	42·6	86	2		N.W.
29	·37	56·3	29·4	103·8	48·7	48·7	100	10		W.
30	29·82	56·5	35·0	102·4	48·3	45·6	81	6	·07	N.E.
Mean	29·89	59·9	43·7	100·7	54·0	46·7	88	7·2	Total 2·30	

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/°	0—10	In.	
1	30·04	57·9	44·7	104·2	50·1	48·2	87	6		N.E.
2	·23	55·1	40·7	80·7	48·1	47·0	93	5		N.W.
3	·42	60·3	42·2	75·2	51·1	48·0	80	8		N.W.
4	·32	58·2	45·6	79·5	49·9	46·7	79	10		N.E.
5	·28	56·2	47·6	106·7	50·4	41·8	51	10		N.E.
6	·22	53·1	46·5	70·1	47·9	41·4	60	10		N.W.
7	30·01	58·0	45·1	102·9	47·9	45·8	86	8		N.W.
8	29·90	60·8	45·3	103·2	50·9	48·3	82	8		N.W.
9	·75	57·2	44·7	77·7	47·9	47·0	94	10	·01	N.E.
10	·40	50·8	42·7	73·6	43·9	42·9	92	10	·17	W.
11	·76	47·4	31·3	97·2	45·4	37·7	53	5	·03	N.W.
12	·60	48·6	28·6	93·7	33·6	32·8	91	7	·01	N.W.
13	·74	45·0	23·5	59·1	32·7	32·0	90	10	trace	S.
14	·79	48·6	32·3	78·2	47·1	39·9	66	10	·03	W.
15	29·90	49·1	32·3	87·8	38.3	35·3	75	2	trace	N.E.
16	30·39	50·1	29·4	92·1	35·4	35·8	99	10		W.
17	·29	54·1	35·3	92·7	43·9	41·7	84	4	trace	N.W.
18	·53	51·6	30·8	91·1	38·9	38·9	100	5		N.W.
19	·45	51·1	38·2	87·9	46·2	41·9	72	10		N.W.
20	·35	54·3	39·2	75·7	46·1	44·3	87	10		S.W.
21	·32	51·2	29·8	94·1	36·0	35·8	98	2	trace	E.
22	·37	51·3	24·9	86·4	39·0	28·8	89	3	trace	W.
23	30·26	52·8	27·9	89·1	41·2	40·9	98	8	·06	S.E.
24	29·97	44·8	37·2	85·7	39·9	37·4	96	5		N.
25	30·44	43·8	29·1	83·7	32·8	30·0	69	3		N.
26	·47	49·7	22·5	89·7	29·4	28·9	91	5	trace	S.E.
27	30·09	53·0	28·9	67·9	46·2	43·6	82	10	·18	S.E.
28	29·69	54·8	43·4	101·7	52·7	52·1	96	8	trace	W.
29	·66	56·7	41·7	102·7	47·0	45·7	91	7	·53	S.
30	·71	51·0	36·8	97·7	41·7	40·3	89	4	·03	S.W.
31	29·59	49·1	36·3	95·1	38·4	37·0	88	7		S.W.
Mean	30·06	52·4	36·3	87·8	43·2	40·6	84	7·1	Total 1·05	

NOVEMBER.

Date	Barom. Reduced.	Thermometers.					Relative Humidity.	Cloud.	Rain.	Wind.
		Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.				
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·35	49·1	35·8	50·5	48·1	43·9	72	10	·45	S.E.
2	29·18	52·6	34·6	92·6	42·4	42·4	100	5	·42	W.
3	28·83	52·4	40·0	89·6	48·4	48·1	98	8	·48	S.E.
4	28·93	55·1	41·6	94·4	46·9	45·0	87	1	·13	S.W.
5	29·46	54·5	35·3	98·2	40·8	40·5	98	7	·23	S.W.
6	·29	53·6	48·6	92·1	42·7	42·2	96	0	trace	S.E.
7	·39	47·4	38·9	80·1	42·9	42·7	98	9	·57	E.
8	·68	49·1	42·4	63·6	47·4	46·2	92	10	·08	E.
9	·46	46·5	43·7	50·7	45·6	45·6	100	10	·41	N.E.
10	·78	50·4	43·7	50·7	44·7	44·0	95	10	·04	N.W.
11	29.90	47·5	37·5	74·9	40·4	40·4	100	10	·03	N.
12	30·11	43·9	37·1	72·0	38·6	38·4	98	5	trace	N.W.
13	30·05	41·1	38·2	42·9	39·0	37·4	80	10		N.E.
14	29·64	42·6	36·1	58·5	38·6	37·7	92	10	·03	N.E.
15	30·06	38·0	28·9	76·9	33·2	32·3	89	8		N.
16	·34	38·0	19·6	71·4	23·0			10		S.E.
17	30·07	38·0	15·1	71·6	24·4			10		N.E.
18	29·39	32·1	15·1	35·5	29·9			10	·13	N.E.
19	·24	38·6	27·8	65·3	30·3			5	·28	W.
20	·48	39·5	30.3	58·8	35·0			10	trace	N.
21	·52	37·3	28·4	56·1	30·4			10	·03	S.W.
22	·62	42·7	29·7	57·6	37·4			10	·08	N.E.
23	·90	40·9	36·8	61·6	37·9	36·8	90	10	trace	N.W.
24	·86	37·5	30·3	40·5	34·0	33·8	98	10	trace	N.
25	·68	47.1	31.2	68·0	37·0	36·6	96	0		S.W.
26	·77	50·7	36·7	61·0	48·3	45·0	78	10	·02	S.W.
27	·68	51·0	47·1	79·5	47·1	46·6	97	10	trace	S.W.
28	·92	51·0	37·3	82·1	44·6	43·2	89	8	·31	S.W.
29	·61	43·7	37·9	73·0	38·7	38·7	100	10		N.W.
30	29·80	44·5	29·5	75·6	32·9	32·9	100	4	·01	W.
Mean	29·63	45·2	34·5	68·2	39·0	40·9	93	8.0	3·73	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In	
1	30·15	50·0	32·3	102·9	44·7	44·2	96	10	trace	S.W.
2	·42	51·7	38·4	84·4	44·8	43·3	89	9		S.E.
3	30·18	46·0	42·2	48·5	43·4	42·1	90	10		S.W.
4	29.81	46·0	42·3	55·5	43·4	42·0	89	10	·12	S. W.
5	·82	41·0	34·2	71·4	34·7	34·3	96	1		N.W.
6	·48	42·7	34·0	72·3	40·9	38·9	84	10		S.E.
7	·61	42·3	31·3	62·2	45·8	43·8	86	8	·18	S.E.
8	·67	50·4	32·8	83·4	37·9	37·9	100	10		S.E.
9	·79	52·8	36·3	52.9	37·7	34·3	72	10	·26	N.E.
10	·40		37·2		48·0	45·7	83	10		S.E.
11	29·99	41·2	25·8	56·0	32·7	32·6	98	10	·10	E.
12	30·04	48·5	30·9	72·0	31·7	31·0	90	10	·21	N.E.
13	29·50	49·4	30·5	51·0	48·4	48·4	100	10	·16	S.E.
14	·47	47·0	34·4	90·5	30·5	29·9	90	2	·38	S.E.
15	·20	50·3	34·8	89·0	40·8	40·5	98	6	·13	S.W.
16	·38	52·4	39·2	84·4	50·1	50·1	100	10	·04	S.E.
17	·75	45·6	38·9	80·7	39·8	37·2	79	3		S.W.
18	·77	48·3	33·4	105·3	36·4	34·8	86	0	·11	W.
19	·49	37·0	30·3	61·0	32·4	31·3	86	3		W.
20	·49	31·5	27·9	42·9	33·9	33·6	97	10		S.W.
21	·58	34·5	29·8	46·5	31·9	31·7	97	5		N.W.
22	·88	33·5	30·0	45·0	32·4	31·8	92	10		N.E.
23	·92	39·0	25·9	46·0	31·9	31·7	97	10	·04	N.E.
24	·83	38·9	28·6	44·2	37·8	37·7	99	4	·01	N.W.
25	·90	38·9	27·9	50·7	31·3	30·4	87	2		N.W.
26	29·93	48·3	25·0	44·6	26·9	26·9	100	0		N.E.
27	30·03		19·0	61·7	24·0	24·0	100	0		N.E.
28	29·91		21·5	42·0	32·6	32·1	94	10		N.
29	30·14		22·3	64·2	23·5	23·1	88	7		N.W.
30	·13		22·6	61·3	34·1	33·5	93	10		N.W.
31	30·12		30·9	37·9	32·0	31·8	97	10		S.E.
Mean	29·80	44·1	31·3	63·7	36·6	35·8	92	7·1	Total 1·74	

Total rainfall for the year 20·29 in.

G. WHITFIELD,

METEOROLOGICAL ALBUM KEEPER.

ENTOMOLOGICAL REPORT.

There has been more activity in this branch of our work than we have ever before kown although unfortunately the dates of captures were not preserved for the Phenological Report. The collections sent in for the various prizes contained a larger number of varieties, were better set and more intelligently named than in any previous year. Most of the butterflies and moths previously recorded upon our lists were captured, but no new names were added, from which it would seem as if we are getting towards the close of the list of moths mentioned in Newman to be found in the neighbourhood. We are aware however that the lists of Coleoptera and Neuroptera as well as those of the Tortrices and Tineæ (all published in the Report for 1875) are still very imperfect, and we would suggest to those interested in Entomology that they should during the coming year attempt to enlarge them.

BOTANICAL REPORT.

In the earlier months of the year a number of observations were made of the first flowering of plants which are recorded in the Phenological Report.

During October 1887 several specimens of Uredo Quercus—a minute fungus which grows on the under side of oak-leaves—were observed. This fungus is rare in Britain though not uncommon in France.

ZOOLOGICAL REPORT.

The following interesting observation made by A. B. T. Greenfield seems worth recording. A redstart having built its nest in a hole in a hawthorn tree near the College had on May 26th. laid two eggs. The next day it was found that the redstart had as usual laid another egg, and that a blue tit had also deposited her egg in the same nest. The pair of tits were observed hopping about the tree and uttering shrill cries. Unfortunately they saw their egg carried away by the finders and deserted the nest, otherwise it would have been interesting to watch the end of this extraordinary incident.

NINETEENTH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1888.

"Τὰ γὰρ ἀόρατα αὐτοῦ ἀπὸ κτίσεως κόσμου τοῖς ποιήμασι νοούμενα καθορᾶται, ἥ τε ἀΐδιος αὐτοῦ δύναμις καὶ Θειότης."

Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

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GEORGE BISHOP.

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Contents.

RULES.

1. That this Society be called the "Wellington College Natural Science Society."

2. That the Society consist of Honorary Members, Corresponding Members, Members and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary and Treasurer, and of the Keepers of the Albums.

5. That the Officers, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, ar far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care

of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other B.nefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Associates elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors, except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

List of the Society during the past year.

OFFICERS.

PRESIDENT—S. A. SAUNDER, Esq.
VICE-PRESIDENTS—REV. C. W. PENNY, REV. P. H. KEMPTHORNE, REV. W. GOODCHILD.

SECRETARY { H. A. CRUICKSHANK, A. J. V. DURELL

TREASURER { A. C. DEANE, G. WHITFIELD

ALBUM KEEPERS.

METEOROLOGICAL { G. WHITFIELD, R. A. BIRLEY

ENTOMOLOGICAL { H. B. de V. WILKINSON, J. E. HALES

ZOOLOGICAL—R. SPARROW
BOTANICAL—L. F. S. HORE

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C. C. BETHUNE†	P. A. COX†	A. N. CHAPLIN	W. M. HARRISON
E. F. LANCE	G. K. ANSELL	W. HUDLESTON‡	
E. W. DENNY			

* Left Lent Term, 1888. † Left Easter Term, 1888. ‡ Left Christmas Term, 1888.

List of the Societies and Journals to whom Copies of the Report are sent.

*Winchester College N.H.S.

Cheltenham College N.H.S.

*Marlborough College N.H.S.

Clifton College N.H.S.

*Rugby School N.H.S.

*Dulwich College N.H.S.

*Haileybury College N.H.S.

*King Edward's School, Birmingham, N.H.S.

*Felsted School N.H.S.

*East Kent N.H.S.

British Museum (Natural History.)

*U. S. Geological Survey Office.

Linnean Society.

Royal Meteorological Society.

Geological Survey Office.

Nature.

Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	42	9	7
Subscriptions:			
Lent Term—Honorary Members ...	4	12	6
,, ,, Members and Associates	3	14	6
Easter Term—Honorary Members ...		19	6
,, ,, Members and Associates	4	6	6
Michaelmas Term—Honorary Members		16	6
,, ,, Members and Associates	3	3	0
Sale of Report	7	0	8
	£67	2	9

Expenditure.

	£	s.	d.
Lecture Apparatus...	6	3	7
Meteorological Apparatus..	2	9	6
Entomological Apparatus...		15	6
Entomological Prizes	1	0	0
Hire of slides		5	0
Carriage of Parcels		6	10
Stamps		12	0
Hook, for reading thermometers, &c. ...	1	0	0
Ifould, for charging battery, &c.		9	0
Stationery, Printing notices, &c.		10	0
Printing Report	9	10	0
Balance in hand	44	1	4
	£67	2	9

Examined and found correct, S. A. SAUNDER,
Dec. 17th, 1888.

G. WHITFIELD, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 11th.

M. S. Forster, Esq. gave a lecture on "Polariscope objects for the Microscope," illustrated by means of the Electric Light.

Sound and Light are both produced by wave motion. In the former case each particle gives a forward impulse to the particle in front: in the latter the particles vibrate in all directions at right angles to the line of the ray, much in the same way as the bristles of a tube-cleaner project in all directions from its axis. This was illustrated by a slide, which showed the particles moving from side to side when the motion was slow, but a forward motion only when the speed was increased. Crystallisation was explained as the tendency of particles of certain substances to arrange themselves with their poles in definite directions, much as a number of magnets would do, if they were freed from the force of gravitation, so as to move freely. A definite structure would thus be produced like that of bricks in a wall. This was illustrated by the drying up of a solution of sal-ammoniac, the crystals being seen to fall rapidly into their places on the screen, taking the form of branches of ferns. Iceland spar is the crystal used to polarise light, and does so by causing the vibration to take place in one plane only. Two prisms of the spar are used, and when the position of one is at right angles to that of the other, no light can pass till some other crystalline or organic substance is placed between to take up and transmit the ray. This was illustrated by supposing two railway lines at right angles. No motion could pass from a truck on one to a truck on the other: but if a short oblique length of line were interposed, then motion could be communicated through a truck on the intervening line. These principles were illustrated by slides containing sulphate of copper, salicine, hippuric acid, chlorate of potash, cane sugar, and a section of horse's hoof on a slide mounted by the Treasurer.

A vote of thanks to the lecturer was proposed by Mr. Goodchild.

Saturday, February 25th.

H. F. Newall, Esq. gave a lecture on "Some Peculiarities due to Motion."

The Lecturer began by stating two of the principal laws of motion, (1) that every body moves uniformly in a straight line, except in so far as it is acted upon by impressed force, and, (2) that whatever be the velocity with which a body moves it will always be acted upon by gravity in the same degree and therefore that its motion downwards will be independent of the velocity. Another important law was that if a body were moving with a certain velocity in a given direction and with another velocity in a direction at right angles, to take a special case, then the resultant velocity would be neither in the one direction or the other but would take a course between the two. The knowledge of these laws would, he said, help his audience to understand the experiments that would follow.

A closed brass chain was placed on a pulley and made to revolve rapidly at the rate of 50 ft. per second, and its place was then taken by a ring of india-rubber tubing which was treated in the same way, the result in each case being that a high tension was introduced, and this was shewn in the case of the india-rubber, by its being considerably stretched in the course of the experiment. If the tubing had been uniformly weighted all round, its momentum would have been greater and the tension correspondingly increased.

The brass chain was again placed on the pulley, and when struck with a rod when at rest moved about in the ordinary manner, but when struck when in rapid motion, a wave-like motion was produced which travelled slowly down the chain.

The lecturer then introduced a second pulley drawing the chain, still moving rapidly, to left and right, and directed attention to the fact that when the end was drawn out on one side the two sides separated widely before regaining their former position, but if drawn out on the other they crossed and became entangled.

To explain this phenomenon, the motion of a single link was taken. A link after leaving the pulley was shot off at a tangent by the action of the wheel, but was also acted upon by gravity which resulted in its falling lower and lower the further it got from the pulley, while its motion in a horizontal direction correspondingly decreased, so that in the one case a triangular loop was formed and in the other the sides overlapped.

A finer chain was then taken, and when the chain was distorted the wave of motion travelled downwards, not steadily but in confused jerks. The reason for this was that the chain was not of uniform thickness, though in this case the difference was only very slight. A chain was next taken in which the want of regularity was very marked, and this made the motion so irregular that it was thrown off the pulley. The india-rubber was then tried again, and when the motion was greatest it was knocked off the pulley, and the motion being still retained it ran along the ground like a hoop. This was also tried with a smaller india-rubber ring along a plank and with great success.

Some experiments in rotatory motion were then shewn. The lecturer first took an ordinary gyroscope, and this when at rest could be tilted at ease, but when the wheel was set in motion it was very difficult to do so.

Again when a weight was attached to one side of the axis it did not pull down the side to which it was attached but produced circular motion. A larger weight was applied which made the motion very rapid. The wheel was then removed from its stand and suspended from its axle by a string, when the same principle was illustrated. The wheel was also passed round that the audience might feel for themselves the resistance to motion. This was again illustrated by a wheel of larger proportions weighing about 30 lbs. to which a weight of 7 lbs. was attached, the result being the same as in the case of the smaller weight. The lecturer also supported it by a string from both sides, and attempted to turn it by twisting, but it turned at right angles, and if he attempted to turn it quickly it was almost wrenched from his hands.

Smoke rings formed by fumes of Hydrochloric Acid and Ammonia were next propelled through a hole in a box towards the screen. When two were sent rapidly after each other they would knock and go away in separate directions as elastic balls. A paper ring was next set up about two feet from the hole, and the smoke rings as they approached the paper contracted in size and so got through.

The lecturer after a few more remarks said that time must now bring his lecture to a close, whereupon Mr. Carr rose to propose a vote of thanks, saying that Mr. Newall was to be greeted as an old friend and not only as a lecturer. He also spoke of the kindness he had shewn in travelling such a distance for our benefit, especially as the greater part of the journey from Cambridge was, as Mr. Saunder said, on the South Eastern Railway, on which all the peculiarities of motion except the right one were fully illustrated.

Saturday, March 10th.

The Rev. A. Carr gave a lecture on "Ravenna."

The lecturer began by saying that the way to Ravenna was a 5 hours' journey by rail—*by Italian railway*—from Bologna across the wide plain which forms the delta of the Po. The town is situated at the end of a lagoon or swampy marsh, where only rushes and rice are grown. It has now no magnificent streets, but is a city of the past, having shrunk back from its ancient walls and even from the sea, owing to the alluvial deposit of the River Po. It once was a naval station, but now only a few small vessels float on the canal between Ravenna and the sea. The want of good water, proverbial in ancient times as now, makes a stay in Ravenna far from pleasant. Although the exterior of the town presents an unpromising appearance, the churches are full of the most beautiful mosaics and are richly decorated with monuments of ecclesiastical art.

The interest of the history of Ravenna centres in a period of about a century and a half—from the accession of the Emperor Honorius in 395 to the death of Justinian in 565; this period can be divided into 3 parts. (1) The reign of Honorius and his sister Galla Placidia; (2) The Gothic supremacy in Ravenna; (3) The reign of Justinian. Since there are very few memorials in the world which relate to this particular period besides those at Ravenna, it has been called the "Pompeii of the Fifth and Sixth Centuries."

The lecturer next gave us an interesting sketch of the history of Ravenna, explaining that so long as the Emperor Theodosius reigned the Goths were kept out of Italy. He was succeeded in 395 by his sons Honorius and Arcadius, the former in the West, and the latter in the East at Constantinople. By this time Rome had long ceased to be the capital of Italy, and its place had been taken by Milan, but later on Honorius removed his court from thence to Ravenna, contrary to the persuasions of Stilicho his general, as being a retreat and shelter from the invasions of the Goths who now crossed the Rhine and came into the Western Empire.

In 410 Rome was sacked by Alaric, and in this siege, Galla Placidia, daughter of Theodosius and sister of Honorius, was taken prisoner. This lady afterwards became the wife of Adolphus the successor of Alaric, king of the Visigoths.

She accompanied her husband into Gaul and Spain where he met his death in 414 by the hand of an assassin. She again became a captive but was ransomed by her brother Honorius for 600,000 measures of wheat. On her return to Ravenna she was married to Constantius against her will, she soon went to

Constantinople and afterwards came back to Ravenna where she reigned in her son's name from 425—450, decorating the churches there with the most lovely mosaics. A slide was then shewn of her mausoleum, the walls of which are covered with beautifully-coloured mosaic work, representing amongst others the picture of our Saviour as the Good Shepherd, and stags coming down to drink at a fountain, a symbol of the Gentile world being brought into Christianity. In the centre of the chapel stands her marble tomb, inside which she was placed seated on a throne in her Imperial robes; up to the end of the 16th. century it was possible to see her in this position through an aperture in the tomb, where she would still probably remain, had not some "naughty boys" thrown in some lighted paper and burnt her remains! In this mausoleum are situated the tombs of Honorius and Constantius; these are the only tombs of the Caesars either in the East or in the West that have remained in their original position. Amongst other places of interest is the chapel in the Archbishop's palace, in which services have been daily performed from 450, the date of the building, up to the present time. On the walls of this chapel are represented figures of the Virgin Mary, and our Saviour clothed in Imperial purple, as well as figures of St. Sebastian and St. Fabian and other Saints. Next a slide of the Baptistery, octagonal in shape, was shewn, containing a baptismal font and beautifully decorated with rich mosaic work. It might be mentioned that these chapels were built in the first period mentioned above.

The Roman empire in the West ended in 476, when the Emperor was deposed by Odoacer who was eventually driven out of Ravenna by Theodoric, king of the Ostrogoths, who reigned there from 489—526. A view of the tomb of Theodoric was then shewn, being in a sense the only genuine specimen of Gothic architecture, now turned into a church, the dome of which is composed of one solid stone 36 feet in diameter and weighing 200 tons. The geologists tell us that it was brought from Istria across the Adriatic Sea, but by what means it was placed in position remains a mystery. The next slide shewn was that of a circular bell-tower, or campanile, of the church of S. Apollinare Nuovo, built about 500, as an Arian Cathedral. The mosaics belong to the Catholic period, half a century later.

The older Church of S. Apollinare in Classe, once the centre of a large population, is now three miles from Ravenna, and with the exception of its monastery stands quite alone and deserted. The next place of interest shewn by the lecturer was the church of San Vitale with mosaic representations of the Emperor Justinian and his wife Theodora surrounded by courtiers. In

another part of the chapel was a picture of Moses with the purple stripe of the Roman Senator on his robe, feeding sheep. These last two churches belong to the third period.

The lecturer concluded by thanking Mr. Owen Hagreen and those who had kindly assisted him for the great trouble they had taken in preparing the paintings of some of the mosaics.

Mr. Kempthorne then rose to propose a vote of thanks to the lecturer, which was carried unanimously. On our way out some excellent photographs of the mosaic work in different churches in Ravenna were to be seen.

Saturday, March 24th.

H. M. Elder, Esq. gave a lecture on "Dyes and Dyeing."

Dyeing is far too large a subject to treat in even a cursory way in the course of an hour's lecture, and therefore it is best to pay attention only to a few of the general principles on which the dyer bases his methods, and illustrate these by some examples of special processes. There is no general rule according to which dyes combine with the fibres they are applied to, and different fibres act very differently with dyes that are applied to them. Thus silk and wool, animal fibres, take up most colours very readily indeed, while cotton and other vegetable products are hardly coloured at all in the same baths, but require the use of a chemical called a mordant, which probably forms a loose combination with the fibre and the dye and so renders the colour fast. There are many mordants in common use and these have a powerful effect on the colour produced even with the same dye.

Thus alizarin, the colouring principle of madder, when combined with a mordant composed of acetate of aluminium, forms the well known Turkey red, if however acetate of iron is used a violet or even a black may be produced, and by this means by mixing and applying to calico various strengths of these solutions, it is possible to produce a pattern of various colours on a white ground in one operation.

Fabrics that are to be dyed in light colours require to be very carefully bleached. Much more so than those which are to be sold as white. In the latter case brilliancy is often imparted by dyeing the fabric a very pale blue, and so neutralizing the effect of the somewhat yellow colour of the natural fibre.

The following special processes are of some interest,

1. Chrome Yellow. In this "style" of dyeing the cotton or other fabric is impregnated with acetate of lead and passed into a bath containing chromate of potash. These salts react, forming

insoluble chromate of lead in the fibre. The shade is a bright yellow, but may be modified to an orange and is fairly fast, but is liable to be blackened by the sulphur always present in the air of towns. It is not applicable to wool because that material contains sulphur.

2. Prussian blue. This dye is produced in a very similar way to the last, by passing the yarn alternately into "becks" of nitrate of iron and ferrocyanide (prussiate) of potash.

3. Anilin black. This is a very interesting process, being one of those cases where the dye is formed on the fibre. Cotton is immersed in a bath containing anilin and potassium dichromate in presence of excess of acid. The anilin is slowly oxidized to anilin black and deposited on the fibre. It is a "style" more used in printing than in dyeing.

4. Indigo gives a splendid deep blue, which is produced on the fibre in a manner peculiar to itself. The dye itself is absolutely insoluble in water or in fact any of the ordinary solvents that the dyer could use. It is necessary therefore for him to convert it into a soluble form and introduce it into the material in this state, and then reconvert it into indigo blue, which being insoluble makes one of the fastest dyes known. This is done by a process called by chemists "reduction." That is to say the blue is acted on by an agent that has the power of abstracting oxygen, or, what comes to nearly the same thing, adding hydrogen and thus converted into indigo white which is soluble in alkalies. This is absorbed by the fibre, and then, on exposure to the air, is rapidly reoxidized to indigo blue.

5. Quite different is the action of Nicolson's blue, a dye-stuff obtained from coal tar. This is absorbed by the fibre as a nearly colourless salt from its alkaline or neutral solution. It is then "soured" by being passed through a beck of dilute acid which sets free the acid of the salt which is a deep blue and insoluble, thus developing a fast and brilliant colour on the wares.

6. Lastly, there are two modern processes which are of great interest, in which an insoluble dye is formed on the fibre itself. They are known by the names of their inventors as Dawson's and Holliday's patents. In these, which are essentially the same, a diazo-benzene or napthalene compound is formed and the suitably prepared cotton is treated with this, then a phenol is allowed to combine with the diazo compound on the fibre and forms with it a very fast dye.

There are many hundreds, or perhaps thousands, of dyeing processes in common use, of which the above may be taken as to some extent typical.

A vote of thanks to the lecturer was proposed by Mr. Moore.

Saturday, May 12th.

The REV. C. W. PENNY opened a discussion on "Country walks and what to observe."

Mr. Penny read a series of extracts from notes of walks made by himself, and gave some valuable hints, both as what to observe, and how to record the observations made. He particularly impressed upon his hearers the necessity of writing down everything at once, and offered a Prize for the best note book of Natural History observations made during the term. The discussion was continued by Mr. Bevir, Mr. Awdry, Mr. Whitcombe, Mr. Moore and A. C. Deane. The proceedings closed with a vote of thanks to Mr. Penny proposed by the President.

Saturday, May 26th.

L. BOLTON, Esq. (of the Patent Office) gave a lecture on "The vagaries of Inventors."

The lecturer divided his subject into three classes: (i) inventions worthless, because not original, (ii) those intrinsically worthless, (iii) those possessing some merit but made ridiculous by irrelevant matter. It was then explained how the prevalent idea that one could not patent a thing unless it was new, was entirely a mistake: it often seemed as if people went to a museum, or looked into a shop window, and saw something to take their fancy there, and went straight home and invented it. During the Crimean war a man invented a suit of plate-armour for horses, almost exactly like those preserved in the Tower. Passing to the second class, of impracticable fancies, only twelve years ago was patented an invention for transmitting an electric current through a string of healthy animals, or medicated baths to a brush or plate applied to the diseased part of a human body: the man evidently believed that the vitality of the healthy animals—horses or cows were specially recommended—would be transferred to the patient. As late as 1884 a patent was granted for "a hair scent extract" prepared from the "hair of healthy females possessing good digestion," which laid claim to "energising and animating influences," and was to be inhaled or added to food. It consisted of a homœopathic dilution of hair which it contained in quantities varying from one part in 10,000 to one part in 1,000,000,000,000,000. If made from the hair of badly-digesting females, its effect might be mortal. In 1795 appeared "The reanimating solar tincture," which heals in a short time cuts, stabs or gun-shot wounds—if not mortal—its fond parent cautiously added.

Then came the class of persons who scorn the principle of the conservation of energy, and construct perpetual motors: this of all hobbies is the most fruitful in melancholy results to its votaries. Four typical examples of this craze were demonstrated by figures. A self propelling ship was invented in 1868: the screw propels the ship, the paddles drive the screw, and the paddles—well the ship itself—after a good push to start with—drives them: an initial motion is imparted to the paddles by sails or the tide; or in the case of ocean going vessels a mysterious apparatus designated "the original patent windlass" is used for the same purpose. Brakes are provided lest the velocity should become excessive. Again, we have an invention for lighting a submarine vessel by introducing light faster than it can escape, by a series of mirrors and revolving prisms, and so accumulating it. The premises on which this invention is grounded are extravagant, one of them requiring us to "suppose oneself changed into an atom on which the sun shines at mid-day." Another marine invention was a compass without a magnet, thus rendered independent of neighbouring masses of iron—"an iron-bound coast" for example. A number of hands fitted with dials are geared together so that if one be moved a similar motion is imparted to all the others. If therefore the course of the ship is to be North East one of the hands is directed to that point as shown on its dial, and the other hands will tell us whither to steer. In 1884 a process was announced of extracting gold from wheat: straw is chopped fine and digested in water, and after the decoction has stood so many hours a scum will come to the surface which is stated to be gold! Then a contrivance was patented for lifting a boat out of the water while in motion and so removing unnecessary friction: wedges are to be put under the boat, and so, as she goes faster and faster, she will be lifted higher and higher out of the waves, till at last she skims frictionless along the surface. Lastly, the lecturer solemnly assured us, though he could not actually find the specifications, that a device was once proposed to "lay the devil," and a gun produced to fire square bullets at Turks, and round ones at Christians.

To pass to the third division. In 1767, a glass coating was, quite rationally, invented for ships' bottoms, only it was added with great force, that if the marine-animal attacked this armour he would meet with his 'ne plus ultra.' In 1808, was patented an apparatus entitled the "Ess or George's Wain," in which motion was imparted to a rotary fan by gases generated by combustion or otherwise. The list of materials used for fuel exhausts everything which could possibly be devoted to that purpose, including even those substances "which the servants of Nebuchadnezzar resorted to when in his fury he commanded

that they should heat the furnace seven times hotter than it was wont to be heated." In 1858, a man took out a patent for using useless "invalid" submarine telegraph cables, for drinking American beverages: with it, about a pint of 'cocktail' or 'gin sling' might easily be drunk per hour. The lecturer concluded with some curious extracts from the Letters Patent relating to the "Game called Fives," and a vote of thanks proposed by Mr. Goodchild for the most amusing lecture the theatre has heard for many years, was carried by acclamation.

Saturday, June 9th.

A most interesting Conversazione was held in the Old Gymnasium. A fine collection of Microscopes was exhibited, and the Photographic department, under the care of Mr. Kempthorne, was well represented. We especially noticed a detective camera which is worn under the coat, and by means of which six views can be taken in succession by merely pulling a string. The electric batteries gave great amusement throughout, as did also a double cone which apparently ran up hill under the action of gravity. In the Natural History department, over which Mr. Bevir presided, some live bats and snakes, found in the neighbourhood of the College, were to be seen. The exhibition was concluded by a most successful explosion of an imitation geyser outside the Gymnasium.

Saturday, July 7th.

A meeting was held for the exhibition of Natural History collections made during the term, and for a discussion which, in the absence of Mr. Penny, was opened by Mr. Bevir. In speaking of reptiles, to which he chiefly devoted his remarks, Mr. Bevir said

There are only three species of snakes to be found in England, unless the Blind Worm, whose Latin name Anguis Fragilis wrongly suggests a snake, be reckoned among the number. First there is the grass snake (Natrix Torquata) which is very common about here. It is easily recognisable, being green with dark spots on its back, a yellowish belly, and a considerable amount of yellow about the head. I have come across many fine specimens this year, one measuring nearly five feet. There is one fact noticeable about them, and that is, that they have been provided by nature with an unpleasant odour as a means of protection; and any one who handles wild or tame snakes will find that their smell varies inversely according to their acquaintance with the person handling them. Secondly

there is the Adder (Vipera Communis) the only English viper, (i.e. viviparous snake) and the only poisonous one. It is easy to distinguish it from the grass snake as it has a dark diaper pattern all down its back, a black belly, and a dark V on the head. I have been keeping one which I meant to exhibit to-night, but unfortunately the storm of two nights ago, blew the adder and its habitation out of window. When first caught it struck several times at the end of a stick, shooting the poison from its tooth some two or three inches up the stick.

Both these snakes take kindly to the water, and hence the general belief in an English water-snake. I believe such a beast is not even European. The 'Biscia' which Dante describes as pursuing the frogs around Ravenna (Inf. ix. 76),

> "Even as the frogs before the hostile serpent,
> Across the water scatter all abroad,
> Until each one is huddled on the earth,"

I believe to be nothing more than the grass snake which I have seen myself swimming around Heath-pool, and which White mentions as lying actually under water, lurking for prey. There is however a third English species of snake, of which I can find no notice in the books of the beginning of the century. It is called Columella Levis, the smooth crowned snake, and is very rare. The head is smaller than that of the other snakes, and though dark underneath it is rounder in body than a viper, and is marked with spots on the back. I have had two specimens brought me this year both from near the lakes; I have only seen one specimen of the kind before. This is the only snake which 'hitches on' to its food, and clings; and as it abounds in Malta is probably the viper mentioned in the Acts of the Apostles.

To pass from snakes to lizards; how many kinds are to be found here? The nomenclature of Naturalists has greatly confused the question, Lacerta Agilis having been applied indiscriminately to the sand lizard and to the ordinary Viviparous Lizard (Zootoca Vivipara). I am only aware of having seen the latter of these here, but this year I had brought me two lizards, both jet black all over. Are they a freak of nature or some other species? People talk of the smooth and scaleless lizard, this as far as I can make out is nothing but the common newt, (Salamandra Aquatica) that will live with perfect contentment in a damp place. In fact the newt has a wonderful power of adapting itself to circumstances. I have had several male and female for two months. Finding themselves in a confined space with hard walls, the males divested themselves of their gorgeous notched dragon-like tail and adopted a more modest but business-like sword-shaped appendage with which they may always be seen

later in the year. I refrained from giving them any definite food for three weeks, but continually changed their water; the females increased in size, but the males got somewhat spare. I then introduced tadpoles, but was surprised to find on the following morning, the tadpoles busily engaged in eating two newts they had killed.

Leaving the subject of reptiles, the speaker went on to animals, particularly Hedgehogs, of which he produced a very lively specimen, that under civilization had come to refuse all food except cake and milk, and after making a few observations on birds, finished by reviewing the entomology of the year as far as it had gone.

The discussion was continued by C. B. Bonham, Mr. Awdry, L. S. Downes, P. H. Anderson, W. A. Payn, A. C. Deane, T. Denman, J. E. Hales, T. C. Macaulay and F. H. Wolley-Dod.

The meeting concluded with a vote of thanks to Mr. Bevir proposed by the President.

Saturday, July 21st.

A. C. Deane read the Pender Prize Essay, the subject of which was "The Structure of Insects."

The writer began by remarking on the almost boundless number of forms contained in the family of Insects, and the consequent difficulty of giving them adequate treatment within the limit of an essay; accordingly, those forms had been selected for description which might serve as types of the remainder. In all scientific research the value of analogy and comparison is very great; and on this account the various species were not described individually, but particular organs were taken, and their various modifications traced through the different genera.

The Wings of Insects were first described. Reference was made to the great speed possessed by Insects, and various specimens of wings were magnified, and projected on the screen by means of the electric light. The curious hooks on the lower wings of the Hymenoptera were shown, and their use described. Next were mentioned the minute scales or feathers to which the colouring of the wings of the Lepidoptera, as well as the metallic lustre of the wing-cases of many beetles are due, and some of these were shown. A further use of the wings was mentioned, that of producing the "buzz" of the blue-bottle and the "chirp" of the grasshopper.

Passing on to the Feet, reference was made to the common but erroneous theory that flies use their feet as suckers, and can hold on to windows and ceilings by atmospheric pressure. The true explanation probably is that the fly excretes a viscid

fluid from its feet, which enables it to withstand the action of gravity. Several legs of Insects were then exhibited, and also a leg of a spider, which, it was mentioned, is not an insect at all, but belongs to a higher family, the Arachnida.

The Mouths of Insects were treated next, and the wonderful variety of forms they present illustrated. But in all, however apparently unlike, the long tongue of the Bee, the sucker of the Butterfly, and the biting jaws of a Beetle, the same structure and component parts are found.

The Breathing Apparatus of Insects was then illustrated, and the Tracheae and Spiracles shown; the Eyes, which in the Dragon-fly amount to 24,000, and the Ears, which are most probably represented by the Antennæ. Several of these were shown, and their great variety illustrated.

The Stings of the Wasp and Bee were next described, and the beautiful apparatus by which the poison is injected through them.

In conclusion, the author hoped that the many Entomologists of the School would use the microscope as an adjunct to their pursuit, and that everyone would carry a pocket lens, as thus they would perceive beauties of whose existence they had never dreamed before.

Mr. Kempthorne thanked the lecturer for the trouble he had taken in illustrating the paper, and said a few words about the origin and history of the prize.

Saturday, October 6th.

A meeting was held in the Drawing School, when Mr. Penny opened a discussion on "The work of the past holidays."

He gave a most interesting account of an excursion of the Dorset Field Club to Weymouth, and described a tesselated Roman pavement in three colours, which they saw at Preston. The party then drove to Chesil Beach where they noticed some curious plants. Before resuming his seat Mr. Penny passed round for examination some flowers from that district.

Mr. Elton next rose to ask whether an animal which he described as black, about a foot long and with a tail about half that length was a pole-cat or a marten. He also mentioned having seen 20 primroses on Sept. 20, and wanted to know whether this was not most unusual.

Mr. Caulfeild had heard caterpillars in a wood dropping on the leaves like rain.

Mr. Davenport, referring to those troublesome insects the earwigs, advised the use of a hollow beanstalk to catch them,

and gave some interesting notes on a drive to Silchester, and a visit to the Duke of Wellington's house.

Mr. Awdry had seen goat-moth caterpillars in a log, and also the caterpillar of an elephant Hawk moth. He believed this year had been a bad one for squirrels. Coins and stones were then produced from Wickham bushes.

Wolley Dod said he had noticed many squirrels about this year, and could not agree with Mr. Awdry.

A discussion then arose as to whether squirrels eat twigs and gnaw the tender shoots, which was decided in the affirmative.

After A. J. V. Durell had spoken, Mr. Kempthorne mentioned that that morning a kingfisher had killed itself by flying against a window of his house.

Macaulay, after describing some salamanders which he had seen in Germany, asked why mosquitoes always came out after rain. Amongst other things he had seen a quarry worked by the Romans.

Gayer, and after him, Zedlitz, answered Macaulay's question as regards salamanders.

Mr. Saunder then proposed a vote of thanks to Mr. Penny for his kindness in opening the discussion.

Saturday, October 20th.

The Rev. P. H. Kempthorne gave a lecture entitled "Belgium to Vienna by road, with hints on Cycling tours."

He claimed the Cyclist as a real traveller, as distinguished from a mere excursionist and wandering athlete. He shewed how rapidly and delightfully the wheelman changes the scenes, the people, and even the seasons, and what opportunities were offered for seeing people as they really are.

He then described his own route, dwelling particularly on the physical features of the country. In company with Messrs. Williams and Ruston, he ascended the Meuse from Namur, descended by the Saur to Trèves, thence down the Moselle to Berncastet, joined the Rhine at Bingen, ascended by the Main Valley to Frankfurt, Aschaffenburg, Würzburg, Nürnberg. He joined the Danube at Ratisbon, and proceeded by Passau, Linz, and St. Pölten to Vienna. He dwelt at some length on the manners and customs of the Bavarian peasantry, and the more striking features of the towns, noting especially the ever present soldiers and officers of the Germany army.

The Cyclists met with a friendly welcome everywhere, and had no difficulty with cycles or Photographic apparatus, except on the frontier of Austria, where a duty of £2 10s. (returnable however) is charged upon a tricycle.

The tour of 750 miles took three weeks exactly. The roads of Germany were approved, but it was mentioned that those of Austria could not be recommended except for bicycles. As regards luggage, Mr Kempthorne carried 23lbs including the Photographic Apparatus, and Mr. Williams managed 15lbs scccessfully in two packets upon a Rover Safety Bicycle.

The lecture was illustrated by a number of lantern views many of which were the lecturer's own negatives.

A vote of thanks was proposed by the Rev. C. W. Penny.

Saturday, December 1st.

E. A. Upcott, Esq. gave a lecture on "English Church Architecture."

He stated that his object was simply to trace the history of English Church Architecture, and that though his examples were all taken from Cathedrals, they would give a very good idea of Church Architecture in general, and were useful as shewing the various styles on a large scale. He began from the Norman Conquest, saying that though there were Saxon buildings before that date, they were principally interesting to antiquarians.

The Norman style was that which the Normans brought with them from their native land, and was a form of the Romanesque; its main characteristics were the round arch and the massive columns. But about a hundred years after the Norman Conquest a new style arose throughout Northern Europe, which was distinguished by the use of the pointed arch and slender pillars. This Gothic style, as it was called, might so far as England alone was concerned be divided into three periods, covering roughly the 13th, 14th, and 15th centuries respectively. These were the Early English, the Decorated, and the Perpendicular.

After these, men began to recur to classic styles, and the Gothic style went out of fashion. Between the several styles there had of course been periods of transition, and as our Cathedrals had generally been built not at one time but by successive generations, they present examples of different styles side by side.

The plan of our Cathedrals perhaps came from the Roman basilicae or law-courts, which consisted of an oblong, with generally a round apse at one end. Then a transept was added, giving the whole a cruciform appearance. The short choir was frequently lengthened by the addition of a Presbytery, and again of a Lady-Chapel at the extreme East end. The West end of a Cathedral is thus nearly always the oldest portion of the building, though a West front was sometimes added without materially enlarging the interior.

A photographic slide of the choir of Peterboro' Cathedral was then shewn, which represented, as the lecturer explained, if not exactly the earliest style of Norman architecture, at any rate the chief characteristics of the Norman style as a whole. He pointed out the three stories which are found in various proportions in all Cathedrals, namely the pier-arches, the triforium, or blind-story, and the clerestory. It was a characteristic of Norman Architecture to have these stories of equal height, or nearly so, while later styles tended to diminish the triforium in proportion to the other stories.

A view of Durham Cathedral, with its castle-like form, squared buttresses, and pointed window in a semicircular recess, formerly intended for a Norman window, was followed by another of the nave of Ely Cathedral. Here the capitals of the columns were plain, and few mouldings were seen, but the arches were slightly recessed. The roof was flat, painted, and made of wood; another sign of Norman workmanship. Another characteristic of the Norman style, the "chevron," or zig-zag moulding, was shewn in photographs of Wenlock Abbey and the Galilee porch of Durham Cathedral.

The origin of the Gothic arch was perhaps to be looked for in the fact, that it was the only way in which the difficulty of arching over unequal spaces with arches of equal height could be met: or perhaps arose from the habit of making intersected arcades, which practically involved the construction of pointed arches. The next slide was that of Canterbury Cathedral, in which the lecturer pointed out the transition from the Norman to the Early English style.

Views of different parts of Salisbury Cathedral were then shewn, Mr. Upcott pointing out that the windows were still plain. Specimens of dog-tooth moulding followed, examples of which may be seen on the cornice in our own chapel. With reference to the next slide, the West front at Peterboro', Mr. Upcott explained the origin of window tracery, the characteristic feature of the Decorated style; how it arose from plate tracery, which in its turn led to bar-tracery. Ripon Cathedral shewed us specimens of "geometrical tracery," and then followed a drawing of the tracery of a beautiful window in the "flowing" style, in which the veins of a leaf were represented. This was to be seen in a transept in Lincoln Cathedral.

Other slides followed, in which might be noticed the crockets on the towers, and the trefoiled arcades of Lincoln Cathedral.

The next style to which our attention was called was the "perpendicular," which we were reminded was a decline from the Gothic, for though exceedingly beautiful in skilful hands it was apt to become monotonous. It was very suitable for painted glass. As an example of this, the window in the West front of

Winchester Cathedral was shewn and much admired. With a photograph of the exterior of Henry VIIth's Chapel at Westminster Abbey, with its flying buttresses, and York Minster, the lecture, like all other good things, came to an end.

Mr. Wickham rose to represent the feelings of the audience in thanking Mr. Upcott, and told us how Macaulay used to spend his Easter holidays in going over one or two of the English Cathedrals. When Mr. de Havilland had asked a few questions on architecture the audience dispersed.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Saturday, February 4th.

At a P.B.M., T. C. E. C. Macaulay, A. Bannerman, J. V. Taylor, B. T. Ready, F. F. Ready, H. H. Bond, L. S. Downes, P. H. Anderson, G. Knowles, P. A. Cox, G. K. Ansell, B. R. Horsbrugh, H. G. Le Mesurier, R. A. H. Watson, G. H. L. Ruxton, U. F. Ruxton, A. C. Fraser, C. St. S. C. Pasley, A. H. Bergne-Coupland, R. W. Holland, T. S. Simson, G. de St. C. Rollo, T. O. R. Sladen, H. S. Holley, N. A. Tharp, H. F. Blair, W. B. Cotton were elected Associates.

Rev. W. Duthoit, D.C.L., H. G. Armstrong, Esq., M. S. Forster, Esq., were elected Honorary Members.

A. B. Ward and J. C. V. Durell were elected to serve on the Committee for the term.

J. E. Hales was elected Entomological Album Keeper.

Friday, March 16th.

At a P.B.M., R. W. Fox was elected an Associate.

R. Crawley was elected a Corresponding Member.

At a Committee Meeting, A. J. V. Durell, G. Whitfield, J. E. Hales, W. F. Smith, J. N. Wright, C. B. Bonham were elected Members.

Monday, May 7th.

At a P.B.M. G. P. Boys, P. G. Best, J. Driffield, A. N. Chaplin, W. Hudleston, G. Hudleston, H. W. Boys, C. Walter, P. L. Foster, T. Denman were elected Associates.

J. R. de M. Abbott and C. B. Bonham were elected to serve on the Committee for the term.

At a Committee Meeting, H. A. Cruickshank and J. N. Wright were elected judges for the Pender Prize.

Saturday, May 12th.

At a P.B.M., H. D. Pack-Beresford, W. E. D. Bell, J. H. Preston, H. C. Armstrong were proposed for Associates.

R. Sparrow was elected Zoological Album Keeper.

Monday, July 30th.

At a P.B.M., H. A. Cruickshank resigned the office of Secretary, and a vote of thanks was passed to him.

A. C. Deane resigned the office of Treasurer, and a vote of thanks was passed to him.

A. J. V. Durell was elected Secretary.

G. Whitfield was elected Treasurer.

Wednesday, October 3rd.

At a P.B.M., R. A. Birley, W. E. Pye, J. B. Gibb, R. B. Crofton, E. H. Stevenson, H. F. Fuller, A. C. Fraser, G. L. Tragett, E. A. Manisty, A. F. Fellowes, W. E. Miller, E. St. J. Brownlow were elected Associates.

R. A. Birley was elected Meteorological Album Keeper.

J. C. V. Durell and J. R. de M. Abbott were elected to serve on the Committee for the term.

At a Committee Meeting H. Laing and R. C. Gayer were elected Members.

PRIZES.

A prize of the value of £5 is given annually by Lady Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for the competition:

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term, with a sealed envelope containing the author's name.

2. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitor's *bonâ fide* own work, may be on a subject connected with any branch of science recognised by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That preference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays, one on some branch of Physics, and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term, and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term, on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1888 was awarded to A. C. Deane for an Essay on "The structure of Insects," an abstract of which will be found on pages 22, 23.

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

Mr. Bevir also offered a Prize open to the whole Middle School for the best collection of all insects, except dragon-flies, made by any one collector during the Summer term.

The work done for the entomological prizes this year, must be ranked on quite a different standard from other years, as several of those collections which were passed by without mention this year would have secured a prize in former years. The chief features about them were, the large quantities of Bee clear wings both large and small (Macroglossa Fuciformis and Macroglossa Bombyliformis) exhibited, the first serious attempt to arrange and classify a certain number of the Tortrices, Tineae and Pterophori, and to blow and mount the Larvae, and exhibit them by the side with the perfect insect. The prizes were awarded as follows:

Natural Science Society's Lepidoptera prizes:

C. C. Bethune, J. E. Hales } First Prize.

W. B. Cotton, F. H. Wolley-Dod } Second Prize.

Hon. Mention ... R. Sparrow.

Middle School Insect Prize:

C. C. Bethune, F. H. Wolley-Dod } Prize.

Hon. Mention ... J. D. Ghica
H. S. Toppin.

Mr. Penny offered a prize, value £1, for the best set of notes made during the Summer term on the occurrence of Animals, Birds, Insects, Flowers, &c. in the neighbourhood of Wellington College. Several very good note books were sent in shewing that great interest had been taken in the work. The prize was awarded to R. W. Holland, accessit F. H. Wolley Dod. J. Warren was specially commended for Entomological notes.

This being the first year, in which any attempt has been made at keeping a Naturalist's note book, it has been thought not out of place, if we publish selections from two of the best note books for the month of May.

May 1st. Saw a common Sandpiper (Totanus Hypoleucus) this bird has not been seen here before.

May 13th. After breakfast I went into the wood. On a larch tree in the sun I saw some Black Ants, some were going up the tree, some were coming down. Those going up were thin looking and black, those coming down striped, being full of the moisture they got off the fir boughs. A little further in the wood I found a nest of Yellow Ants; a little way off I found a Red Ants' nest. I put four Red and four Yellow Ants together in a box, and they began to fight. They do not seem to help one another, but let each individual go on fighting till he has killed the other or been killed. The Red seem stronger than the Yellow. But the Red and Black are pretty evenly matched, the Red if anything being the slightest bit the stronger. On going back to the Ants' nest, I observed some small white Woodlice, which Sir John Lubbock says have become blind and live entirely with the Ants, and are never touched or taken any notice of by them.

In the afternoon I saw a Centipede, which struck me as exceedingly long. I killed it and counted its legs, there were 98. The Laurel and Blackthorn are now in flower. In the evening I heard a Night jar or Fern owl for the first time.

May 14th. Noticed a pair of Martins (Hirundo Urbica) building outside the School Library.

In the afternoon I went up to a Carrion Crow's nest in Cox's wood, which I had found a few days previously. Knowing that crows are terribly game, and great egg stealers, and great enemies to all game preserves, I felt quite justified in taking all the eggs of which there were four; I was extremely surprised to find that they were nearly all new laid, as Crows generally hatch out their young by the end of April. One of the eggs was very curiously marked and rather smaller than the rest.

(Here follows a list of flowers found.)

I found a Chaffinch's nest with one egg in it, also a Linnet's in a furze bush.

On the banks of the Blackwater I picked up the body of a Kingfisher very much decayed. I also saw some Sparrow Buntings.

May 16th. A heavy shower fell in the afternoon. The Catkins are out. On trees that have Catkins there are Male and Female, they are fertilized either by the wind or by insects. The long and hanging down ones are males, the short stumpy ones generally sticking up are the females, as shewn in the plate.

May 17th. A very wet day and rather windy, the Catkins have begun to fall off. The Lilacs have begun to come out. The Copper Beeches have now got a sort of light red brown leaves. The Furze is well in bloom.

May 18th. I caught a Peacock (Vanessa Io) and lots of Heath Moths (Fidonia Atomaria), also Grizzled Skipper (Thymele Alveolus), a small Yellow Underwing and Gamma. I noticed nearly all the flower on the fir was dead.

May 19th. In the afternoon I went for a walk through Heath pool into Mr. Walter's Woods, to look for Woodpeckers' eggs. I selected a Beech with Woodpeckers' holes in it, but when I got to the bottom of the hole found nothing but three Starling's eggs. Passing another Beech tree my attention was attracted by a chorus of squeaks issuing from a hole above me. Thinking the noise to be caused by young birds, I climbed the tree to try and discover what sort of birds they were. Finding the hole went upwards instead of downwards, I put a stick in and out flew six large Bats. They all seemed to be able to fly well except one which seemed too sleepy to do so, so I captured it. It had a great deal of yellowish hair on its back, and was much bigger than the Common Bat. On investigation I found it to be Scotophilus Noctula—the Noctula. In another Beech tree with a hole I observed about thirty Hive Bees coming out; an escaped swarm I suppose. I noticed a Ruby Tiger (Arctia Fuliginosa) and a Puss Moth (Dicranura Vinula). It has been a dullish day, with two showers in the afternoon. Under a Beech tree I picked up four sucked Starling's eggs and one Jackdaw's. I saw an ants' nest in the heather which must have been at least three feet across every way, and between three and four feet high.

May 20th. I went for a walk on the Ridges. I picked a Blue Bell with thirty-seven bells. The Bracken is about six inches high now. The flower of the Holly is coming out. I saw a Red start, and found a White throat's nest. The leaves of the Wood Anemone are coming up, also the leaves of the Wild Pea. The

small Strawberry flower is out and the Forget-me-not. I picked a Lord Arum, also an Orchis. The leaves of the Ash are out, this is before the Oak, the consequence will be 'a splash.' As I was passing the Swimming Bath I heard a curious sort of screaming, produced by some small birds. On going to see what was the matter a Cuckoo (Cuculus Canorus) flew out pursued by three White throats. At about 9.30 I heard some Nightingales (Philomela Luscinia) in the Brickfields.

May 21st. Found a Woolly Bear. The Oak trees have begun to burst. Found a Jay's nest in a fir tree in the middle of the heather. The situation for the nest was uncommonly low down hardly ten feet from the ground. It contained four eggs. Jays are terrible egg-destroyers; they will suck every egg they come across, whether it be a Thrush's or a Pheasant's. Found Celery Leaved Buttercup (Ranunculus Sceleratus), Milkwort (Polygala Vulgaris), Lousewort (Pedicularis Sylvatica).

May 24th. Found a Black-headed Bunting's nest (Emberiza Schœniclus) in some reeds by the side of one of the Blackwater ditches. It contained five eggs. Blew a Starling's egg (Sturnus Vulgaris) which I had taken out of a nest of four young ones. It was the only egg in the nest, and as the young ones were about three days old, I thought it would be addled, but when I came to blow it, I found that it was quite new laid. This is not the first instance of the kind I have known. Starlings seem rather indifferent to the time and place for laying their eggs. Once I found four Starling's eggs in a Jackdaw's nest, with four Jackdaw's eggs, a few days after the Jackdaw had been shot. Found Cuckoo Flower (Cardamine Pratensis) and Green Veined White Butterfly (Pieris Napi).

May 25th. Went out catching Butterflies, and climbed up to a Missel Thrush's nest. I found the old bird sitting dead, with two eggs under her. I held a Post-Mortem, but could not ascertain the cause of her death. I found a Great Tit (Parus Major) sitting on nine eggs in the hollow stump of an alder tree. I could hardly distinguish her at first from the nest, but she soon let me know she was there. She raised herself into an upright position, elongated her neck, opened her beak wide, and made a sort of whirring noise (with her wings I imagine) two or three times at intervals of a few seconds. I gently removed her from her nest and took three eggs.

May 26th. I revisited the Great Tit's nest to see if she were any the worse for the fright I must have given her, but she did not seem to be, as I found her still sitting. She again greeted me with the whirring noise. I did not disturb her again.

Caught a Green Hair-Streak (Thecla Rubi), and saw a Small Copper (Polyommatus Phlæas) and an Emperor Moth. There is a quantity of Ragged Robin in blossom.

May 27th. Found a Wasp's nest about the size of a Walnut, hanging from the ledge of a sandy bank near Little Sandhurst. Saw a Blindworm about a foot long. Birdsfoot Trefoil, Broom, Wood Vetch, Wood Crowfoot and Marsh Marigold in bloom.

May 29th. There are quantities of Fox Moths on the heather. Caught a Bordered White (the first this year).

May 30th, at about 7.30 p.m., I saw a Cuckoo out of my window. I first saw it flying straight away from the House, and it settled in a tree about 70 yards away. It then flew back slowly, and I saw it settle on a ledge about ten feet from the ground. It remained there for about a minute, and then flew back to the tree. It repeated its journey six times, each time remaining for about three minutes in the tree. During one of its journeys I had gone out and concealed myself near where it settled on the House. It came to within ten yards of me and settled on the wall, but it soon caught sight of me and went back to the tree. I thought perhaps it wanted to deposit an egg in some nest, that it had found there; but then, why should it make its journey six times? After the sixth time it flew right away. Cuckoos are generally supposed to lay their eggs on the ground and carry them thence in their beaks to a nest.

A bird's-nesting friend of mine told me that in the afternoon he had found a young Cuckoo in a Tree Pippit's nest (Anthus Arboreus). Beside the young Cuckoo the nest contained five young Tree Pippits (just hatched) and one egg.

Found a Cockchafer (Melolontha Vulgaris) and a Death Watch (Anobium Striatum).

PHENOLOGICAL REPORT.

The following observations have been made of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list. The observers have been Mr. Penny, Mr. Davenport and R. Sparrow.

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &C.)

1	**Anemone nemorosa** (Wood Anemone)		
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)	May	7
3	*Ranunculus acris* (Upright Crowfoot)	May	9
4	**Caltha palustris** (Marsh Marigold)	May	7
5	*Papaver Rhœas* (Red Poppy)	June	15
6	*Nasturtium officinale* (Water Cress)		
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)	May	24
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)	May	7
9	*Draba Verna* (Whitlow Grass)	May	8
10	*Viola odorata* (Sweet Violet)		
11	*Polygala vulgaris* (Milkwort)	May	20
12	*Lychnis Flos-cuculi* (Ragged Robin)	June	12
13	*Stellaria Holostea* (Greater Stitchwort)	May	7
14	**Malva sylvestris** (Common Mallow)	June	22
15	*Hypericum tetrapterum* (Square St. John's Wort)		
16	,, *pulchrum* (Upright St. John's Wort)		
17	**Geranium Robertianum** (Herb Robert)	May	26
18	*Euonymus europæus* (Spindle Tree)		
19	*Acer Pseudo-platanus* (Sycamore)	May	20
20	*Æsculus Hippocastanum* (Horse Chesnut)		
21	*Cytisus Laburnum* (Laburnum)		
22	**Trifolium repens** (Dutch Clover)		
23	*Lotus corniculatus* (Bird's Foot Trefoil)	May	25
24	*Vicia Cracca* (Tufted Vetch)	May	27
25	,, *sepium* (Bush Vetch)	May	22
26	*Lathyrus pratensis* (Meadow Vetchling)		
27	**Prunus spinosa** (Sloe, or Black-thorn)	May	10
28	*Spiræa Ulmaria* (Meadow Sweet)		
29	*Potentilla anserina* (Silver-weed)	July	10
30	*Rosa canina* (Dog Rose)	July	1
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)	May	23
32	*Cratœgus Oxyacantha* (Hawthorn)	June	1
33	*Epilobium hirsutum* (Great Hairy Willow-herb)		
34	,, *montanum* (Broad Willow-herb)		
35	*Angelica sylvestris* (Wild Angelica)		
36	*Daucus Carota* (Wild Carrot)		
37	**Hedera Helix** (Ivy)		
38	*Cornus sanguinea* (Dog-Wood)		
39	*Syringa vulgaris* (Lilac)		
40	*Galium Aparine* (Cleavers)	May	26
41	,, *verum* (Yellow Bedstraw)		
42	*Dipsacus sylvestris* (Wild Teasel)		

43	*Scabiosa succisa* (Devil's-bit)		
44	*Petasites vulgaris* (Butter-bur)		
45	**Tussilago Farfara** (Coltsfoot)		
46	**Achillea Millefolium** (Milfoil, or Yarrow)	May	11
47	*Chrysanthemum Leucanthemum* (Ox-eye)	May	26
48	*Artemisia vulgaris* (Mugwort)		
49	*Senecio Jacobæa* (Ragwort)	June	3
50	**Centaurea nigra** (Black Knap-weed)		
51	*Carduus lanceolatus* (Spear Thistle)		
52	,, *arvensis* (Field Thistle)		
53	*Sonchus arvensis* (Corn Sow Thistle)		
54	*Hieracium Pilosella* (Mouse-ear or Hawk-weed)	June	6
55	**Campanula rotundifolia** (Hair-bell)		
56	*Ligustrum vulgare* (Privet)		
57	**Convolvulus sepium** (Greater Bind-weed)		
58	*Symphytum officinale* (Comfrey)		
59	*Pedicularis sylvatica* (Red Rattle)	May	20
60	*Veronica Chamædrys* (Germander Speedwell)	May	7
61	*Mentha aquatica* (Water Mint)		
62	*Thymus Serpyllum* (Wild Thyme)		
63	*Prunella vulgaris* (Self-heal)		
64	*Nepeta Glechoma* (Ground Ivy)	May	7
65	*Galeopsis Tetrahit* (Hemp-nettle)		
66	*Stachys sylvatica* (Hedge Woundwort)		
67	*Ajuga reptans* (Bugle)	May	25
68	**Primula veris** (Cowslip)	May	11
69	*Plantago lanceolata* (Ribwort Plantain)	May	20
70	*Mercurialis perennis* (Dog's Mercury)	May	7
71	*Ulmus montana* (Wych Elm)		
72	*Salix Caprea* (Great Sallow)		
73	*Fagus sylvatica* (Beech)		
74	*Corylus Avellana* (Hazel)		
75	*Orchis maculata* (Spotted Orchis)	May	10
76	*Iris Pseud-acorus* (Yellow Iris)	June	16
77	*Narcissus Pseudo-narcissus* (Daffodil)	April	27
78	*Galanthus nivalis* (Snowdrop)		
79	**Scilla nutans** (Blue-bell)	May	7

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY).

80	*Melolontha vulgaris* (Cock Chafer, or May Bug)		
81	*Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)		
82	*Timarcha lævigata* (Bloody-nose Beetle)		
83	*Lampyris noctiluca* (Glow-worm)		
84	*Apis mellifica* (Honey Bee, or Common Hive Bee)		
85	*Vespa vulgaris* (Wasp)	May	13
86	*Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)	May	23
87	,, *Rapæ* (Small Garden White or Cabbage Butterfly)	May	18
88	*Anthocharis Cardamines* (Orange-tip Butterfly)	May	22
89	*Epinephile Janira* (Meadow-brown Butterfly)	July	5
90	*Bibio Marci* (St. Mark's Fly)		

BIRDS.

(ARRIVAL ; SONG ; NESTING ; FIRST EGG.)

91	*Strix aluco* (Brown Owl)	
92	*Muscicapa grisola* (Flycatcher)	
93	*Turdus musicus* (Song Thrush)	sg. Jan. 28
94	,, *pilaris* (Fieldfare)	
95	*Daulias luscinia* (Nightingale)	sg. April 21
96	*Saxicola œnanthe* (Wheatear)	
97	*Phylloscopus trochilus* (Willow Wren)	
98	,, *collybita* (Chiff chaff)	
99	*Alauda arvensis* (Sky-lark)	sg. Jan. 10
100	*Fringilla cœlebs* (Chaffinch)	sg. Jan. 26
101	*Corvus frugilegus* (Rook)	
102	*Cuculus canorus* (Cuckoo)	arr. & sg. April 27
103	*Hirundo rustica* (Swallow, or Chimney Swallow)	arr. April 9, last seen Oct. 13
104	,, *urbica* (House Martin)	arr. April 29
105	,, *riparia* (Sand-Martin)	
106	*Cypselus apus* (Swift)	arr. May 10
107	*Caprimulgus europœus* (Goatsucker, or Fern-owl)	sg. June 18
108	*Columba turtur* (Turtle Dove)	
109	*Perdix cinerea* (Partridge)	
110	*Scolopax rusticola* (Woodcock)	
111	*Crex pratensis* (Corncrake, or Land Rail)	

MISCELLANEOUS.

(FIRST APPEARANCE.)

112 Frog Spawn

METEOROLOGICAL REPORT.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/₀	0—10	In.	
1	29·62		22·9	65·7	24·9	24·5	89	9	·02	S.E.
2	·26		24·2	65·1	41·6	40·7	93	9	·27	S.
3	·85		30·5	78·2	35·1	34·7	96	5		S.W.
4	·87		34·7	55·2	41·8	39·5	82	10	·04	S.
5	29·61		39·1	77·8	44·7	44·2	96	10		S.W.
6	30·10		34·8	49·9	37·0	36·7	97	9	·07	S.W.
7	·22	48·1	36·3	72·6	44·8	43·7	92	10		N.W.
8	·45	50·6	41·4	56·8	46·3	46·1	99	10		S.W.
9	·59	54·2	41·8	42·4	43·6	42·5	92	10		N.W.
10	·64	47·2	31·3	75·1	33·5	33·2	97	10		S.E.
11	·59	35·1	27·7	41·9	31·7			10	·02	S.E.
12	·56	34·9	29·8	33·8	32·7	32·1	92	10	·02	S.
13	·58	35·1	31·8	37·9	33·4	33·3	99	10		S.
14	·48	34·0	27·7	34·0	31·2			10		N.E.
15	·43	33·4	28·4	38·5	33·2	32·0	86	10		E.
16	·31	32·7	30·3	34·0	31·5	30·7	89	10		N.E.
17	·45	33·8	29·6	42·0	31·9	31·7	97	9		N.E.
18	·49	34·0	22·6	56·0	30·7	29·8	86	8		N.E.
19	·58	33·6	30·2	36·8	33·7	32·0	82	10		S.
20	·43	45·9	26·4	64·3	29·4			10	·20	S.W.
21	30·07	48·9	28·6	52·0	45·9	45·7	99	10	·15	S.W.
22	29.83	46·8	42·2	54·0	44·2	43·3	93	10		S.W.
23	30·27	52·9	39·4	84·5	40·5	39·9	95	10		N.E.
24	·41	44·8	34·2	78·2	37·0	35·8	89	8		W.
25	30·29	46·7	36·5	85·8	39·9	39·8	99	10		W.
26	29·86	45·9	39·4	68·1	44·9	40·8	72	8		N.W.
27	30·21	43·2	32·6	77·2	34·9	33·3	84	4	·05	N.W.
28	29·93	37·6	22·5	72·8	29·3	28·1	78	3		N.
29	29·90	36·7	28·2	79·5	32·0	31·7	96	8		N.
30	30·05	37·9	17·1	78·7	21·7			0	·05	W.
31	29·39	41·9	21·3	78·0	36·3	35·8	96	10		S.
Mean	30·17	41·4	31·1	60·2	36·1	36·3	91	8·7	Total ·89	

FEBRUARY.

Date	Barom. Reduced.	Thermomometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/。	0—10	In.	
1	29·80	31·9	28·9	73·1	30·3	29·8	92	8		N.E.
2	30·18	36·5	14·7	48·1	22·1			3	·04	S.
3	29·79	45·7	21·4	73·2	36·9				·07	S.
4	30·23	48·7	36·4	71·6	42·7	41·1	87	6		W.
5	·32	48·7	39·3	80·0	41·9	41·4	96	10	trace	W.
6	·25	51·4	39·3	88·6	44·9	43·0	86	3		N.W.
7	·24	48·4	42·2	66·0	44·4	41·3	92	10	·16	W.
8	30·12	46·6	39·2	53·1	41·9	41·4	96	7	trace	S.W.
9	29·99	47·4	41·2	86·6	45·4	44·7	95	10	trace	S.W.
10	·88	46·4	38·3	56·8	45·4	40·0	65	6	·06	S.
11	·65	41·3	32·4	55·8	35·9	34·8	90	8		W.
12	·52	38·4	31·3	73·1	32·8	31·8	87	9		W.
13	·74	39·7	29·1	83·7	34·6	33·0	83	6		S.W.
14	·50	35·9	33·0	85·6	33·1	33·1	100	10		S.
15	·91	39·2	31·4	81·4	34·8	33·5	86	7		N.E.
16	29·98	36·4	33·5	87·6	33·7	32·8	90	10		N.E.
17	30·03	33·7	23·9	45·7	29·4			10		N.W.
18	29·94	40·0	28·9	86·7	32·4			8	·51	N.W.
19	·48	34·4	26·5	72·7	29·6			10	·06	N.E.
20	·67	30·4	30·1	73·9	29·9			10	·07	N.W.
21	·80	35·8	30·1	60·0	34·0			8		N.E.
22	·83	29·7	29·7	35·0	29·7			10		N.E.
23	·98	29·0	27·0	41·4	27·0			10		N.E.
24	·94	29·4	27·4	82·0	29·4			9		N.E.
25	29·95	32·4	20·1	58·6	29·2			10		N.
26	30·09	34·2	24·2	88·0	29·4			0		N.E.
27	·19	33·6	30·1	41·8	31·8			9		N.
28	·41	33·9	31·4	69·9	31·8			10		N.
	30·38	32·4	28·9	73·9	29·9			10		N.
Mean	29·96	38·3	30·7	68·8	34·3	37·3	89	7·8	Total ·97	

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·31	32·9	26·7	69·2	27·3	26·8	89	10		N.
2	·21	33·8	19·1	80·7	29·7	28·5	80	0	·09	N.E.
3	·00	39·0	28·9	85·5	36·4	33·2	72	4		N.E.
4	·10	40·4	27·2	84·0	31·4	30·8	92	10		W.
5	·05	40·9	26·4	82·0	32·4	31·9	93	10	·08	S.E.
6	·04	48·0	31·8	98·6	40·4	39·3	93	4		W.
7	30·13	48·9	35·8	91·6	40·4	38·7	87	3	trace	S.E.
8	29·76	48·9		73·6	41·7	40·9	94	10	·22	S.W.
9	·51	51·4	45·2	93·3	48·9	48·4	97	10	·04	S.W.
10	29·37	55·3	45·4	106·1	48·4	41·9	97	10	·42	S.W.
11	28·97	45·4	44·5	100·7	45·4	44·8	96	10	·14	S.W.
12	29·27	42·4		78·9	38·0	37·1	92	10		W.
13	·65	42·1	30·5	70·5	31·9	31·2	90	10	·29	N.E.
14	·28	51·4	33·0	101·4	41·1	40·8	98	8	·15	S.E.
15	·27	50·1	36·7	99·4	43·3	40·9	82	4	·15	S.W.
16	·40	36·0	34·0	42·6	34·6	33·3	86	10		N.E.
17	29·78	35·4	30·1	62·1	30·9			10		N.E.
18	30·07	34·5	30·7	99·3	30·7			10		N.E.
19	30·07	33·0	28·9	90·9	28·9			10		N.E.
20	29·99	35·6	30·0	74·6	31·4			10	·15	N.
21	30·21	46·4	32·1	122·2	35·9	33·8	81	8		N.W.
22	30·04	47·9	27·1	73·6	35·8	34·0	84	10	·12	S.W.
23	29·32	42·9	37·1	54·1	41·7	41·6	99	10	·06	S.
24	·42	45·9	33·8	121·4	35·0	34·8	98	10	·32	N.
25	·13	45·9	34·4	82·3	34·5	34·0	95	10	·21	W.
26	.05	45·8	32·0	84·4	38·7	38·0	94	10	·49	N.
27	29·09	41·4	32·7	72·8	32·7	32·4	96	10	·19	W.
28	28·77	44·2	32·9		41·3	40·9	97	10	·14	S.
29	28·79	51·4	38·2		47·0	41·8	66	6	·08	S.E.
30	29·19	47·9	37·2		43·8	40·9	79	8	·12	N.W.
31	29·70	46·0	34·4	78·6	39·5	38·1	89	10	·01	N.
Mean	29·61	43·7	33·0	84·8	37·4	37·0	89	8·5	Total 3·47	

APRIL.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative. Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·96	42·2	27·6	93·9	40·0	37·7	82	6		N.W.
2	·84	50·1	26·0	83·8	41·3	37·6	72	10	·12	W.
3	·84	44·0	27·9	93·7	36·1	33·9	80	8	·05	N.
4	·75	41·4	26·7	87·5	35·1	33·3	83	7	·03	N.
5	29·99	43·7	29·0	96·1	36·3	32·7	69	8		N.E.
6	30·19	44·2	20·3	95·3	35·0	32·5	85	3		N.
7	30·18	44·7	22·3	80·3	37·1	34·6	79	9	·06	N.
8	29·93	41·3	29·9	91·6	33·8	32·3	84	10	·03	N.E.
9	29·97	42·4	25·9	85·0	33·7	32·1	83	10		N.W.
10	30·02	44·4	28·3	80·6	37·1	34·1	75	6	·04	N.
11	29·86	50·9	34·7	84·2	44·2	43·9	98	10	·01	N.W.
12	·78	51·9	38·8	81·8	39·8	38·7	91	10	·08	N.W.
13	·73	59·8	38·8	110·2	51·1	49·5	89	4		W.
14	·90	55·1	41·7	82·9	49·8	47·2	82	9		W.
15	·71	60·9	35·7	92·1	50·8	47·3	77	10	·21	S.E.
16	·90	59·6	37·1	109·3	48·6	45·2	77	4	·14	S.W.
17	·68	50·9	43·0	102·2	48·7	47·8	94	10	·04	S.W.
18	·66	55·9	43·4	114·4	48·1	46·1	86	9	·15	S.W.
19	·55	53·7	39·0	105·6	47·2	45·3	87	10	·32	S.W.
20	·52	49·7	41·8	83·5	45·6	43·6	86	10	trace	N.W.
21	·65	53·6	38·8	104·9	42·8	41·6	90	10		N.W.
22	·58	44·7	31·9	63·2	44·1	42·2	86	10	·13	E.
23	·65	46·8	38·8	64·2	42·1	41·0	91	10	·55	N.E.
24	·77		39·2	73·4	46·6	45·4	92	10	trace	S.E.
25	29·92	49·7	36·2	91·1	39·9	38·7	90	10		N.E.
26	30·09	41·7	35·1	81·7	38·8	35·3	72	10		N.E.
27	30·10	62·1	27·8	92·7	43·9	39·9	72	5		S.W.
28	29·99	58·2	43·5		53·9	51·3	82	10		W.
29	·95	58·3	43·4		46·1	43·0	79	10		S.W.
30	29·74	59·8	42·4		51·0	46·5	71	9		S.
Mean	29·85	50·4	34·5	89·8	43·0	40·7	83	8·6	Total 1·96	

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/。	0—10	In.	
1	29·45	53·9	45·2		50·8	47·1	76	10	trace	S.
2	·87	51·7	37·3		47·0	43·9	79	10	·20	S.
3	29·84	54·3	40·1	81·9	46·7	42·1	69	9		S.W.
4	30·18	56·4	38·5	110·1	48·0	43·9	73	10		S.W.
5	·30	56·9	34·6	103·2	50·9	44·9	63	10		S.
6	·30	57·0	38·1	75·8	50·9	45·9	68	3		S.W.
7	·29	67·4	48·9	123·8	55·3	52·7	83	10		S.W.
8	·19	67·5	48·9	127·8	58·9	54·5	74	10		S.
9	·32	57·0	37·1	113·4	49·4	41·7	55	0		N.W.
10	·39	57·0	38·7	98·7	48·9	41·4	55	10		S.W.
11	·49	61·1	29·4	109·4	48·0	42·5	65	0		N.W.
12	·17	57·8	37·7	115·1	54·7	47·1	57	0		S.
13	30·42	69·9	32·1	116·5	52·6	44·4	58	0		W.
14	29·87	57·8	38·8	111·8	47·9	42·8	67	6		W.
15	·72	60·4	36·9	116·7	50·3	43·1	57	0		N.W.
16	·57	62·6	41·5	104·0	55·9	50·1	66	5	·20	S.W.
17	·58	55·1	49·2	70·7	52·0	51·4	96	10	·51	S.
18	·73	73·4	51·7	128·4	55·1	55·1	100	10		S.
19	29·66	75·5	55·2	126·8	63·7	59·0	74	10	trace	S.
20	30·18	63·0	45·0	121·4	55·7	49·7	65	8		S.W.
21	·43	65·9	40·0	121·5	58·7	52·3	64	10		W.
22	·39	57·3	38·2	115·2	54·8	49·0	65	4	trace	N.E.
23	·36	67·0	40·4	119·4	57·3	50·0	59	2		N.E.
24	·36		39·0	117·5	53·2	49·0	73	3		N.E.
25	·28	61·5	41·8	116·4	46·2	43·0	78	10		N.E.
26	30·16	58·0	39·0	118·2	47·4	42·9	70	10		N.E.
27	29·94	60·6	36·2	111·1	51·7	46·6	69	2		S.
28	·72	83·0	37·7	115·8	54·7	50·4	73	10		N.
29	·97	62·9	43·5	119·1	51·9	47·5	72	2	·20	N.
30	·73	61·9	49·7	113·4	54·8	51·4	78	10		S.
31	29·95	61·8	45·5	119·9	53·9	42·3	46	8		N.W.
Mean	30·06	61·9	41·2	111·7	52·5	47·3	69	6·5	Total 1·11	

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/°	0—10	In.	
1	30·24	67·3	43·9	121·5	55·9	50·2	67	4		W.
2	30·21	74·2	48·3	128·8	58·9	53·7	70	8		S.
3	29·87	77·2	50·2	132·1	71·1	63·6	63	3		S.W.
4	30·08	72·4	48·9	130·4	59·4	55·1	75	4		S.W.
5	30·13	54·8	47·0	97·4	50·9	47·5	78	10	·15	N.E.
6	29·88	59·5	46·1	99·9	51·0	50·8	99	10	trace	S.
7	·87	65·9	47·6	128·8	56·1	53·6	84	5	·06	S.W.
8	·76	63·9	50·5	105·3	57·2	55·5	89	10	·25	S.
9	29·55	73·2	52·1	128·8	54·9	54·5	97	10	·03	W.
10	30·01	63·6	48·8	119·3	59·3	54·5	72	8		W.
11	30·11	67·3	42·5	120·3	51·7	50·5	92	3		S.W.
12	29·78	69·7	47·9	126·3	62·7	57·4	71	10		S.E.
13	·85	63·4	42·7	125·7	55·9	55·6	98	5		S.
14	29·93	62·8	45·6	126·4	57·6	54·0	78	8		S.
15	30·04	57·7	45·8	100·4	52·2	50·1	86	10	·20	W.
16	29·91	62·6	46·9	69·3	51·4	49·1	85	10		N.W.
17	30·09	53·5	46·5	99·7	49·5	41·2	52	10		N.
18	·17	57·0	39·2	97·5	53·0	49·1	75	10		N.E.
19	·22	51·9	45·1	74·3	48·9	46·3	82	10	trace	N.E.
20	30·03	54·9	42·4	79·3	50·7	48·5	85	10	·11	N.
21	29·98	62·7	46·6	111·4	53·7	52·9	94	10	·41	N.
22	30·06	65·2	53·0	111·6	55·9	55·8	99	10		N.
23	30·16	68·0	50·3	122·4	55·8	52·3	78	7	·27	N.
24	29·97	75·0	49·7	121·3	54·6	54·3	98	10		N.
25	·99	80·1	53·8	130·0	74·5	67·5	66	2	·15	N.
26	·87	74·5	59·1	134·6	65·1	63·8	93	10	·18	N.W.
27	·77	64·3	55·3	101·3	61·8	58·4	80	7	·35	S.E.
28	·62	79·2	52·3	123·3	56·8	54·0	82	10	·06	S.W.
29	·59	66·8	52·0	121·2	59·7	54·9	72	5	·06	S.
30	29·67	64·9	48·6	121·6	57·1	52·0	70	2		S.W.
Mean	29·95	65·8	48·3	113.6	56·8	53·6	81	7·7	Total 2·28	

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·03	67·3	39·2	119·0	52·0	48·1	75	8	·04	W.
2	29·98	58·3	49·6	81·2	52·9	52·3	96	10	·52	S.W.
3	·60	67·3	52·0	104·7	58·4	55·2	80	10	·19	S.W.
4	·54	63·7	50·8	122·2	58·4	55·6	82	6	·08	S.W.
5	·49	61·2	53·2	119·5	57·9	54·9	81	10	1·08	S.W.
6	·63	59·5	50·6	86·0	56·6	55·1	67	10	.51	S.
7	29·95		49·2	90·8	51·8	51·2	96	10	trace	S.
8	30·07	62·9	49·6	122·1	56·1	51·8	74	10		S.E.
9	30·02	63·6	48·3	115·6	59·5	55·1	74	2	trace	S.E.
10	29·97	61·4	47·2	123·5	52·4	48·1	49	10	·48	W.
11	29·75	54·7	40·2	89·9	43·6	42·8	94	10	·04	W.
12	30·02	56·9	42·5	108·2	49·9	49·5	97	10		W.
13	30·14	69·0	39·0	123·4	56·8	51·4	68	3		W.
14	29·96	68·0	50·6	119·7	61·8	53·4	56	10	·11	W.
15	·82	59·5	54·3	86·3	56·0	55·5	97	10	·48	W.
16	·49	63·1	53·8	109·2	59·8	58·3	91	10	trace	E.
17	·46	67·1	49·5	79·9	57·8	55·6	92	10	·08	S.W.
18	·48	66·6	55·0	112·6	59·2	57·9	93	10	·45	S.
19	·83	69·9	54·5	124·5	55·9	54·9	93	10	·07	E.
20	·93	61·2	53·2	95·7	59·1	58·1	94	10		S.E.
21	·91	63·6	52·1	112·2	59·2	54·9	75	10		S.W.
22	·87	69·7	56·0	93·5	63·0	58·5	75	10	·11	S.
23	·60	65·9	54·3	122·0	59·9	58·0	89	7	·07	S.E.
24	·72	61·0	53·5	118·2	60·0	56·0	76	8	·08	S.
25	·72	63·4	55·1	96·0	59·4	57·0	86	10		S.E.
26	·73	69·8	52·3	121·8	59·9	51·4	56	8	·35	S.
27	·86	65·9	48·0	122·0	58·4	56·1	85	10	·36	S.
28	·49	84·2	55·9	94·5	60·6	59·1	91	10	·14	S.W.
29	·81	64·9	51·4	120·5	54·9	52·7	84	10	·24	S.W.
30	·49	68·1	53·0	64·7	58·8	57·0	88	10	·05	S.
31	29·81	58·5	53·3	83·4	52·9	51·1	87	10	·36	W.
Mean	29·78	65·2	50·6	105·9	56·9	53·9	82	9·1	Total 5·89	

AUGUST.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·89	54·5	49·5	72·1	50·7	50·5	99	10	.55	N.E.
2	30·02	72·0	49·3	105·4	59·6	58·8	95	10		N.E.
3	·19	59·8	42·0	125·3	61·0	55·5	57	4		N.
4	30·08	76·5	50·2	110·1	58·8	57·1	89	10	·04	S.E.
5	29·76	61·9	51·7	120·7	56·7	50·8	66	6	trace	N.W.
6	30·11	65·2	46·3	110·5	52·4	50·0	84	10	·14	N.
7	·06	76·9	51·1	119·0	65·3	62·9	86	8		N.W.
8	·07	76·7	58·4	126·9	65·4	61·6	79	7		S.W.
9	30·03	79·9	53·1	131·0	72·6	67·4	73	2		S.
10	29·95	80·0	62·1	134·3	74·0			2		S.W.
11	30·03	79·3	52·1	88·1	60·9	58·5	86	10		S.W.
12	29·95	68·5	58·0	114·2	61·8	59·7	88	10	·01	N.W.
13	29·81	66·4	54·3	123·8	62·0	56·0	67	8		N.W.
14	30·15	66·0	41·8	127·1	57·8	51·9	67	2		N.W.
15	·03	66·7	41·1	108·3	53·4	51·0	84	10		N.E.
16	·07	65·2	40·0	112·1	54·2	49·0	68	5		N.E.
17	·06	59·0	46·2	111·6	51·2	51·2	100	10		N.E.
18	·18	61·8	45·6	114·8	52·1	52·1	100	10	·01	N.
19	30·16	65·8	33·5	119·3	57·9	55·6	86	5		S.E.
20	29·92	64·8	52·0	102·3	58·8	55·8	81	10	·20	S.W.
21	·61	66·0	54·0	125·1	58·1	57·1	93	10	·01	N.W.
22	·72	69·4	51·8	123·9	62·7	57·9	73	5		N.W.
23	·87	63·8	48·9	100·2	60·7	58·4	87	10		S.W.
24	·59	70·0	53·4	126·3	62·9	59·3	79	7	·05	S.E.
25	·65	68·9	52·2	126·7	64·0	60·1	78	4	trace	S.
26	·88	67·3	51·5	123·3	60·4	56·0	74	6		N.W.
27	·92	66·3	50·0	110·2	60·4	57·0	80	9	·05	N.W.
28	·79	61·1	55·0	109·3	56·8	56·8	100	10	·60	S.W.
29	·86	68·4	49·1	115·3	58·2	53·2	71	10	·05	W.
30	29·92	64·8	47·1	127·5	56·9	52·6	74	9	·05	S.W.
31	30·17	65·1	41·5	127·4	56·1	51·5	72	8		N.
Mean	29.50	67·5	49·4	115·9	59·6	55·8	81	7·6	Total 1·76	

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·25	65·2	50·5	123·3	55·5	50·5	70	9		N.E.
2	29·98	61·7	56·7	84·8	59·3	56·6	84	10	·17	N.W.
3	·91	67·9	58·6	119·2	59·1	58·4	96	10	·01	S.
4	29·91	65·8	54·9	130·0	56·1	54·8	92	5	trace	S.W.
5	30·02	62·6	57·8	99·6	59·3	57·6	90	9	trace	W.
6	29·96	63·1	57·5	113·8	59·2	57·3	89	10		S.W.
7	29·97	62·5	52·4	118·6	55·9	52·4	78	3	·16	S.W.
8	30·30	62·8	41·3	109·3	53·0	49·8	79	1		N.W.
9	·17	57·4	42·4	107·3	49·4	48·2	92	10	·07	N.
10	·04	60·3	39·2	99·6	55·2	53·1	87	9		N.E.
11	·26	63·7	39·7	112·9	53·3	50·5	81	5		N.
12	·42	66·6	39·0	117·6	56·1	51·5	72	5		N.E.
13	·41	64·8	35·7	120·1	53·5	53·0	97	6		N.W.
14	·21	67·9	48·2	116·3	59·9	57·0	83	10		W.
15	·12	74·9	42·3	126·2	52·4	52·5	100	10	trace	N.
16	·13	73·7	52·1	114·3	58·9	54·8	76	7		N.W.
17	·21	62·0	52·3	110·4	55·9	53·6	86	9		N.W.
18	·23	63·6	44·2	111·9	56·9	54·3	83	6		N.W.
19	·24	64·9	52·5	106·7	57·1	54·5	83	9		N.W.
20	·18	65·8	54·2	106·4	57·6	55·7	88	8		N.
21	·16	64·8	48·0	113·3	55·4	54·1	92	10	trace	N.E.
22	·16	65·0	45·5	62·6	50·8	50·0	94	10	trace	E.
23	30·11	59·2	47·6	67·4	50·9	50·9	100	10	·04	N.W.
24	29·92	64·0	46·7	109·4	56·8	56·8	100	10	·12	N.
25	29·93	64·3	52·0	70·9	54.3	54·3	100	10	·20	N.E.
26	30·17	60·1	47·3	96·7	53·2	51·0	85	5		E.
27	·15	64·6	40·9	107·4	56·9	52·8	75	5	·07	S.E.
28	30·01	60·6	49·1	72·3	52·7	52·6	99	10	·13	N.W.
29	29·75	60·2	52·0	113·6	58·1	57·6	97	10	·36	N.
30	29·67	51·4	42·6	96·6	46·0	43·0	79	7		
Mean	30·10	63·7	48·1	105·3	55·6	53·3	88	7·9	Total 1·33	

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·65	53·1	33·5	110·1	45·7	42·1	75	4	·01	N.W.
2	·30	46·9	33·8	90·6	40·2	40·2	100	10	·01	N E.
3	·32	51·8	29·5	104·3	43·9	41·7	84	6	·69	S.E.
4	·59	52·2	32·7	87·6	45·1	43·1	86	10	·11	E.
5	·86	50·0		100·0	37·1	35·4	85	0		S.
6	29·87	55·3	28·4	102·3	37·2	36·0	89	1	trace	S.
7	30·06	57·3	29·9	109·1	36·9	34·8	81	7		W.
8	·14	84·2	28·2	110·1	36·3	34·5	84	1		W.
9	·08	58·3	27·9	110·6	38·3	37·9	96	10		E.
10	·15	61·9	32·1		42·9	41·1	86	9		W.
11	·12	73·4	39·5		49·1	48·9	99	10		N.E.
12	30·08	61·3	39·4		46·3	45·6	95	2	·18	N.
13	29·91	52·9	40·2	110·4	48·3	44·1	72	0		W.
14	30·14	48·4	27·0	110·6	35·7	33·3	79	0		S.W.
15	·44	54·1	28·4	90·2	34·1	33·6	95	8		N.
16	·41	53·7	33·4	84·6	39·0	38·8	98	10		E.
17	·25	56·5	32·9	96·9	35·7	35·4	97	10		S.
18		58·3	30·9	94·9	40·1	40·1	100	10		S.E.
19	·28	55·9	39·6	99·1	48·2	48·2	100	0		N.
20	·46	48·4	28·3	110·6	31·0	31·0	100	0		S.W.
21	·63	51·1	28·4	90·8	34·1	33·6	95	0		W.
22	·34	58·8	28·4	95·8	38·9	38·9	100	10		S.E.
23	·18	50·8	33·4	90·5	37·2	36·9	97	7		S.E.
24	30·11	67·5	32·1	98·1	30·2	30·0	96	0	trace	N.
25	29·96	84·2	34·8	100·4	52·1	51·8	94	10	trace	N.
26	30·04	62·8	51·3	100·6	57·9	57·4	97	10		S.
27	·25	60·8	54·6	111·9	59·3	58·2	94	10		S.
28	·25	63·9	54·5	91·4	58·8	56·8	87	3	·31	N.W.
29	·21	55·8	53·3	98·9	55·7	53·2	84	10	·56	W.
30	·04	50·6	45·4	65·1	46·9	46·9	100	10	trace	N.E.
31	30·04	53·5	42·5	87·7	46·9	45·7	92	3	·31	S.W.
Mean	30·07	57·9	35·8	98·3	42·9	41·7	91	5.8	Total 2·18	

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	29·65	18·1	39·7	58·4	40·0	40·0	100	10	·56	S.
2	·43	47·2	39·7	54·1	39·9	39·9	100	10	·49	N.E.
3	·60	53·6	42·5	88·1	44·6	44·2	97	10		N.E.
4	·79	53·7	40·3	89·9	44·6	44·6	100	2	·22	N.E.
5	·79	53·8	43·9	92·7	46·3	46·1	99	0		N.E.
6	·84	41·2	39·7	80·1	40·2	39·6	95	10		N.E.
7	·77	36·4	33·4	57·9	34·0	33·2	91	10	trace	E.
8	·86	43·3	33·4	48·2	36·0	35·5	96	10	·18	E.
9	·75	50·2	35·5	72·4	43·0	42·9	99	10		E.
10	·81	48·3	38·5	80·3	45·4	45·1	98	10	·21	N.E.
11	·85	51·1	35·3	70·9	47·0	46·8	99	10		S.E.
12	·83	54·0	45·6	57·0	46·9	46·7	99	10	·58	E.
13	·88	53·8	46·3	94·7	50·2	50·2	100	10	trace	E.
14	29·91	57·1	43·9	67·6	48·9	48·8	99	0	trace	W.
15	30·00	57·3	44·8	98·1	53·3	53·1	99	10	·03	S.W.
16	·09		44·0	84·3	56·0	56·0	100	10	·02	S.W.
17	·09	53·3	45·8	87·7	49·8	47·9	87	5	·03	S.E.
18	30·06	52·9	44·3	86·5	48·2	48·2	100	10	·04	S.W.
19	29·96	53·1	47·7	62·9	50·9	49·2	88	10	·11	S.
20	29·83	42·7	41·5	89·9	42·2	41·1	91	2		S.E.
21	30·15	49·0	38·9	87·6	42·1	40·0	84	6		S.
22	·21	53·1	41·5	80·1	48·7	47·1	89	8		S.W.
23	30·26	54·7	48·1	84·1	51·0	50·3	95	9		S.W.
24	29·93	54·4	48·8	83·1	51·5	49·4	86	10		W.
25	30·01	56·0	49·0	81·1	53·3	52·1	92	10	·50	S.
26	29·62	50·6	43·4	84·5	45·7	45·1	96	10	·11	S.
27	·43	52·9	42·0	84·2	50·8	50·2	96	10	·08	S.W.
28	·49	43·3	34·2	42·5	35·0	34·7	97	2	·57	S.E.
29	·31	51·1	34·8	64·8	43·0	42·2	94	4	·28	E.
30	29·25	47·4	45·2	47·4	47·4	46·7	95	10	·18	S.E.
Mean	29·81	50·5	41·7	75·4	45·9	45·2	95	7·9	Total 4·19	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In	
1	29·02	48·7	35·4	80·5	36·9	36·6	97	1	trace	W.
2	29·05	54·8	36·1	103·6	47·4	46·6	94	6	trace	S.W.
3	28·99		36·1	72·1	49·4	48·5	97	4	trace	S.
4	29·02	57·9	49·0	121·5	52·0	52·0	100	7	trace	S.
5	·17	57·0	48·2	92·6	51·9	51·9	100	10	trace	S.
6	29·95	54·9	50·0	65·0	50·9	50·9	100	10		S.W.
7	30·02	53·8	40·3	92·4	42·1	41·4	95	1		S
8	·08	42·4	38·0	54·1	43·0	43·0	100	10	·18	S.
9	·27	41·8	35·4		31·9	31·6	95	10		S. W.
10	·36	39·1	23·7	77·3	29·3			0		S.
11	·32	36·2	23·6	61·6	25·0			10		S.
12	·31	49·4	24·5	70·6	33·0			2		W.
13	·35	55·6	28·5		30·4			4		S.W.
14	·26	34·5	23·6	38·7	32·2			10		E.
15	·48	39·7	28·2	45·5	31·0			10		S.
16	·57	38·4	31·3	39·0	35·9	35·7	98	10		S.W.
17	·42	37·0	28·7	38·0	33·4			10		S.E.
18	30·22	44·8	24·7	75·6	26·9			2	·02	S.E.
19	29·94	45·9	25·1	52·0	44·7	44·7	100	10		S.E.
20	·64	48·1	41·4	53·3	44·4	44·4	100	10		S.E.
21	·28	49·3	43·7	69·7	46·1	44·2	87	8	·32	S.E.
22	·09	50·9	45·1	85·3	48·0	46·8	92	10	·01	S.
23	·48	46·9	44·4	54·4	45·3	44·3	92	10	·05	S.
24	·50	49·9	41·4	56·2	46·0	45·7	98	10	·36	S.
25	·71	48·5	30·6	62·1	33·1	33·0	99	2	·18	S.E.
26	·74	44·6	32·4	85·2	38·9	38·0	92	7	·03	S.
27	·89	48·1	32·1	62·1	38·9	38·3	95	8	·28	S.E.
28	·45	47·9	38·2	50·3	47·0	46·7	98	10	·04	S.
29	·80	38·9	31·3	46·0	36·6	36·0	95	10		N.
30	29·99	39·9	32·3	81·0	33·3	32·6	92	10		N.
31	30·09	31·9	25·8	43·5	27·9	27·9	100	10		S.E.
Mean	29·82	45·9	34·5	66·5	39·1	41·8	96	7·5	Total 1·47	

Total rainfall for the year 27·50 in.

R. A. BIRLEY,

Meteorological Album Keeper.

ENTOMOLOGICAL REPORT.

This summer a great many hawk moths have been seen, Fuciformis having been abundant in some places on Rhododendrons, and three specimens of Bombyliformis having been taken. Amongst the Diurni several specimens of Artemis have been taken, Polychloros has been bred from the larva, and a variety of Alexis, which has in some lights a colour almost equal to that of Adonis has been observed. Of the rest of the Macros the following new species have been taken:

Phigalia pilosaria	Feb. 1.
Ephyra pendularia	June 22.
Hybernia rupicapraria	Feb. 9.

The Micros taken have not been as yet identified.

The splendid collection of Lepidoptera which we possess has been arranged and placed in the Reading Room.

J. E. HALES,

ENTOMOLOGICAL ALBUM KEEPER.

ZOOLOGICAL REPORT.

We have to thank our neighbour, Mr. Horace W. Monckton, F.G.S., (O.W.), for the following list of land snails and fresh-water shell-fish found in the district round Wellington College.

All are living animals (not fossils) and Mr. Monckton has confined the list to those shells of which he has specimens actually in his own cabinet.

This is, so far as we are aware, the first list of the kind that has been published for our neighbourhood.

Sphærium corneum	all streams, ponds, etc.
Sphærium rivicola	some dead shells from Well. Coll. lakes.
Pisidium species	all streams, ponds, etc.
Unio pictorum	dead shells from Well. Coll. lakes, abound in Basingstoke Canal.
Anodon cygnea	Basingtoke Canal.
Neritina fluviatilis	Well. Coll. lakes, dead shells.
Paludina vivipara	Basingstoke Canal.
Bythinia tentaculata	Basingstoke Canal.
Valvata piscinalis	Sandhurst and Yateley.
Planorbis nitidus	Blackwater River.
Planorbis albus	
Planorbis glaber	Basingstoke Canal.
Planorbis spirorbis	Basingstoke Canal.
Planorbis carinatus	Basingstoke Canal.
Planorbis complanatus	Sandhurst and Yateley, etc.
Planorbis corneus	Sandhurst, very fine specimens in ditches.
Planorbis contortus	Sandhurst, very abundant.
Physa fontinalis	Sandhurst, etc.
Limnæa peregra	all ditches, ponds, etc.
Limnæa auricularia	Basingstoke Canal, ponds near Wokingham.
Limnæa stagnalis	Sandhurst, etc.
Limnæa palustris	Sandhurst.
Limnæa truncatula	Finchampstead, 1 dead shell.
Succinea putris	Sandhurst.
Vitrina pellucida	Sandhurst, etc.
Zonitis cellarius	Sandhurst.
Zonitis alliarius	Sandhurst, etc.
Zonitis nitidulus	everywhere.
Zonitis radiatulus	common, abundant on banks of Blackwater.
Zonitis excavatus	woods between Well. Coll. and Finchampstead.
Zonitis crystallinus	everywhere.
Zonitis fulvus	Sandhurst.
Helix aculeata	Sandhurst.
Helix aspersa	The Common Garden Snail.
Helix hortensis	
Helix cantiana	Sandhurst.
Helix rufescens	Longmoor.
Helix hispida	Watery Lane.
Helix caperata	2 specimens from Tangley.
Helix rotundata	very common.
Bulimus obscurus	Sandhurst.
Cochlicopa lubrica	Sandhurst, etc.
Carychium minimum	Sandhurst.

The following additions have been made to the Fauna of the neighbourhood.

Scotophilus Noctula	The Great Bat.
Totanus Hypoleucus	The Common Sandpiper.

Notes of the observations will be found on pages 32 and 33.

TWENTIETH ANNUAL REPORT

OF THE

Wellington College

NATURAL SCIENCE SOCIETY.

1889.

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Ἐπιστολὴ πρὸς Ῥωμαίους, I. 20.

WELLINGTON COLLEGE.
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Ἐπιστολὴ πρὸς *Ῥωμαίους, I.* 20.

WELLINGTON COLLEGE.
GEORGE BISHOP.

1890.

Contents.

RULES.

1. That this Society be called the "Wellington College Natural Science Society."

2. That the Society consist of Honorary Members, Corresponding Members, Members and Associates; the number of Members being limited to Fifteen, and the number of Associates to Seventy.

3. That all members of the School having attended three Meetings of the Society be eligible as Associates, and that Members be chosen by the Committee from the Associates who are of at least one term's standing, and in the Upper School.

4. That the Society's Officers consist of a President, Vice-Presidents, Secretary and Treasurer, and of the Keepers of the Albums.

5. That the Officers of the Society and of the Photographic Section, with the addition of two Members, who shall be elected at the first P. B. M. of every term, do form a Committee of management, and that in Meetings of the Committee, five be a quorum.

6. That the Secretary, Treasurer, and Album Keepers, be elected annually at the last Meeting of the Midsummer term.

7. That the President and Vice-Presidents be elected from Honorary Members, and that a President on retiring become a Vice-President without election.

8. That the President or one of the Vice-Presidents take the chair at all Meetings, but that the Chairman have no vote except in cases of equality.

9. That the Secretary keep the Minutes of the Society's proceedings; a list of the existing Society, with the names and addresses, as far as possible, of all Honorary and Corresponding Members; and a list of all Benefactors of the Society; and that he produce the Minutes at the last Meeting in each term.

10. That the Treasurer look after the property of the Society, collect subscriptions, and pay debts; producing his accounts whenever called upon by the President to do so.

11. That the duty of the several Album Keepers be to receive all notices connected with their several sections; to take care of the collections; to enter all occurrences of interest in their Albums; and at the last Meeting in each term to produce their Albums for the inspection of the Society.

12. That in the absence of any Officer, the Committee appoint a Deputy.

13. That Honorary Members and Corresponding Members have all the privileges of Members.

14. That Honorary Members pay an entrance fee of 10s., and a subscription of 1s. 6d. a term; or by payment of one guinea compound for future subscriptions.

15. That Members or Associates, on leaving the School, are entitled to become Corresponding Members. Other Old Wellingtonians are eligible for election as Corresponding Members. Corresponding Members pay in advance a subscription of 6s., and receive in return the Society's Report for four years from the date of subscription; or by payment of one guinea compound for future subscriptions. It shall also be in the power of the Committee to elect as Corresponding Members, without any subscriptions, persons who have lectured before the Society, and other Benefactors.

16. That Associates be proposed by a Member or Honorary Member or Associate, seconded by one of the Committee, and elected by the Members; their names, with those of the Proposer and Seconder, having previously been entered in the Candidate Book, to be kept by the President, and that Members be elected by the Committee.

17. That Members pay a subscription of 1s. 6d., and Associates of 1s. per term. No one may use the privileges of a Member or Associate until he has paid his subscription for the term. Associates elected after half term pay no subscription for the term.

18. That at every P.B.M. the list of Members and Associates who have not paid their subscriptions be read out by the President and that at the last Meeting of every term, those who have not yet paid be formally ejected by a vote of the Society. The reading of names may be dispensed with at the President's discretion.

19. That Members may speak and vote at all Meetings of the Society; may read Papers, with the leave of the President; and receive a copy of the Society's Report.

20. That Associates may speak at all Meetings; and may read Papers with the leave of the President.

21. That Members and Associates provide with tickets the visitors whom they introduce at any Meeting, and that no visitors, except those who accompany Honorary Members, be admitted to any Meeting of the Society without such ticket; but in special cases the Committee be empowered to issue extra tickets. N.B.—This rule is only to be enforced when the President thinks fit.

22. That Prefects may attend all Public Meetings without tickets.

23. That any Member or Associate may be suspended or expelled from the Society by a vote of two-thirds of the Members present, if he, from any misdemeanour or want of energy, appear to deserve such suspension or expulsion.

24. That Meetings be ordinarily held once a fortnight, but that the Secretary be empowered to call Extraordinary Meetings when necessary.

25. That visitors may speak and read Papers at all Public Meetings, with the leave of the President.

26. That all objects intended for exhibition at any of the Society's Meetings be submitted to the President at least two days before, and that they be accompanied on exhibition with a written description; further, that all exhibitions are to be made at the conclusion of the Paper or Lecture.

27. That the Editing Committee consist of the President, the Secretary, and one Member or Associate to be elected by the Society.

28. That a certain number of Officers be told off to collect the exhibitions.

29. That no change be made in these Rules unless proposed by a Member or Honorary Member, and carried by a majority of the votes of the Members present at a subsequent Meeting.

30. That the sanction of the President be requisite for all motions relating to the expenditure of the Society.

31. That additional Members and Associates may be elected if the candidates have special qualifications, but that the number of Members thus elected do not exceed five.

32. That additional Members, elected by the provisions of Rule 31, if Album Keepers, need not be in the Upper School.

33. That there be a Photographic Section of the Society.

34. That the Officers of the Photographic Section consist of a Director and of a Secretary, who shall also be Treasurer of the Section.

35. That the Director of the Photographic Section be elected from the Honorary Members.

36. That the Photographic Section have the right of electing its own Officers and of making and altering its own bye-laws, provided that nothing is enacted which conflicts with the rules of the Society.

37. That the funds of the Society be chargeable with debts incurred by the Photographic Section to an amount not exceeding in any one year the sum of one shilling per term for each member of the Section.

List of the Society during the past year.

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DIRECTOR OF THE PHOTOGRAPHIC SECTION—REV. P. H. KEMPTHORNE.

SECRETARY OF THE PHOTOGRAPHIC SECTION { P. L. FOSTER. R. H. TAHOURDIN.

ALBUM KEEPERS.

METEOROLOGICAL { R. A. BIRLEY. J. P. SIMEON.

ENTOMOLOGICAL—J. E. HALES.

ZOOLOGICAL—R. SPARROW.

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Those Members and Associates whose names are marked thus ‖ are members also of the Photographic Section.

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F. E. S. HOLLINS
H. E. WALKER
‖ *A. S. WALEY*‡
J. WARREN

* Left Lent Term, 1899. † Left Easter Term, 1899. ‡ Left Christmas Term, 1899.

List of the Societies and Journals to whom Copies of the Report are sent.

- *Winchester College N.H.S.
- Cheltenham College N.H.S.
- *Marlborough College N.H.S.
- Clifton College N.H.S.
- *Rugby School N.H.S.
- *Dulwich College N.H.S.
- *Haileybury College N.H.S.
- *King Edward's School, Birmingham, N.H.S
- *Felsted School N.H.S.
- *East Kent N.H.S.
- British Museum (Natural History.)
- *U. S. Geological Survey Office.
- Linnean Society.
- Royal Meteorological Society.
- Geological Survey Office.
- Nature.
- Science Gossip.

* Those marked with an asterisk exchange Reports with us.

ACCOUNTS.

Receipts.

	£	s.	d.
Balance in hand	44	1	4
Subscriptions:			
Lent Term—Honorary Members ...	2	14	0
,, ,, Members and Associates	3	18	6
Easter Term—Honorary Members ...		16	6
,, ,, Members and Associates	4	19	0
Michaelmas Term—Honorary Members		16	6
,, ,, Members and Associates	4	17	6
Sale of Report	8	0	4
Interest on Deposit in Post Office Savings Bank ...		8	4
	£70	12	0

Examined and found correct, S. A. SAUNDER,
Dec. 16th, 1889.

Expenditure.

	£	s.	d.
Hire and Purchase of Lecture Apparatus	7	14	2
Meteorological Charts		2	6
Entomological Prize		10	0
Carriage of Parcels		10	11
Stamps		14	9
Hook, for reading thermometers	1	0	0
Ifould, for charging battery		9	0
Bishop, for printing Report	10	4	6
Donation to Photographic Dark room ...	7	0	0
Subscriptions repaid to Photographic Section	1	6	0
Balance	41	0	2
	£70	12	0

W. A. PAYN, *Treasurer.*

MINUTES OF OPEN MEETINGS.

Saturday, February 9th.

C. R. Carter, Esq. gave a lecture on "The Common Hive Bee," illustrated by means of the projection microscope and electric light.

The lecturer began by giving a few of his own experiences in bee-keeping, which had been anything but pleasant either to himself or his neighbours, but added that the modern improvements in bar-framed hives minimised the danger and immensely facilitated the manipulation of bees.

A hive consists of three elements, the Queen, the Drone, and the Worker. The first slide showed these three, and the differences in their appearances and shape were explained: the Queen having a long body, brighter colours, and curved sting: the Drone a short thick body, and no sting; the Worker a small body, less bright colours and a straight sting.

Microscopic slides were then exhibited by means of the electric light, showing some of the more important organs of a Worker-bee: the Head, with its Antennæ, which are the means of feeling, hearing, and communication between bees, the three simple eyes for seeing long distances, and the almost innumerable lenses of the compound eyes, adapted for magnifying near, small objects; the tongue, with the manner of lapping the food, not sucking it up, as was generally supposed, (the honey being carried in the first stomach or honey-sack, and disgorged by the bee when it reaches the hive); the front-leg, a diagram being exhibited showing the spur and sail by means of which the Antennæ are cleaned; the hind-leg with the hollow in the thigh, fringed with hair, adapted for holding the pollen and propolis, when the bee is on the wing: the sting, with the way in which it is driven into an object but cannot be extracted, owing to its arrow-head, without sacrificing the life of the bee: the poison-bag, and a muscle. Pollen was also shown, the fertilising dust of flowers, on which the bees feed the young larvæ.

The respective functions of the different kinds of bees were then explained.

The *Queen* lays all the eggs and has control over the executive of the hive, as is shewn by the confusion caused if she is

removed. She is intolerant of a rival and destroys with her teeth and sting any royal grubs that are in the process of being hatched out. She is incapable of collecting honey, making wax, gathering pollen or flying far. She lays on an average in the summer about 2,000 eggs a day.

The *Drone* is the male of the hive, but though the Queen only marries one husband, still about a thousand drones are hatched out in the Spring. They are turned out of the hive at the end of the Summer, and soon starve owing to their inability to get food for themselves.

The *Workers* do all the wax-making, nursing, feeding, collecting, cleaning and guarding of the hive. The method of making wax was described, the bees hanging in festoons and letting the wax exude from the under-side of their abdomens. This is taken to the bees who build the cells. Cells were displayed on a slide, showing their hexagonal shape, and the different kinds of cells, Worker and Drone, were described, as well as the various lengths of times of incubation, and the method of rearing the young larvæ. Some Workers bring in pollen, some honey, some help to unload and store, some bring in propolis, which is used to stop up any cracks in the hive, some act as sentinels, some as scavengers, some as ventilators, some as the body-guard of the Queen. The Queen-cells were next shown, and their peculiar pear-like shape, with the mouth downwards, the young larvæ being fed on a peculiar kind of food, and brought up in a different way to the Workers or Drones. The egg for a Queen is the same as that for a Worker, and it is only the different kind of food and cell that makes the difference in the growth of the insect. This peculiarity is proved by the fact that bees can under exceptional circumstances, if the egg is not too old, make an egg, which has been laid in a Worker cell, grow into a Queen by altering the cell and giving the royal food. If the egg is too far advanced, then all they can do, is to produce a Worker which is capable of laying eggs. These, however, are only Drone-eggs. If the bees intend to swarm, Queen and Drones are hatched out at the same time: the old Queen leads off the swarm, and the first hatched-out Queen kills the others; but if the bees do not allow this, she utters a shrill piping sound, which is a sure sign that the other Queens are to be allowed to hatch out, and a cast or after-swarm may be expected.

The lecturer concluded by giving a few words of practical advice on the way to quiet and handle bees, and by inviting any of his audience who were interested in bees, to come and see the hives he intended to keep the following summer.

A vote of thanks to the lecturer was proposed by Mr. Penny.

Saturday, February 23rd.

Captain E. W. Dun (O.W.) gave a lecture on "Burma," illustrated by means of a large map of the country constructed for the Royal Geographical Society and by lantern slides.

When the famous Prussian Ambassador, the Baron von Bulöw returned to his native country, his friends said, "Now you have been three years in England, tell us all about the English." The Baron replied, "When I had been three months in England I felt I could write a book on it. When I had been there a year I felt some misgivings as to my power of undertaking the task. When I had been there three years I found it impossible to attempt the task."

Now, I am not quite so far gone as the Baron von Bulöw, I was only two years in Burma and I therefore retain sufficient self-confidence to stand up before you this evening, and make a few disjointed remarks upon a country and people interesting from every point of view one can think of.

And first of all I wish to say that I am sufficiently imbued with Baron von Bulöw's spirit to be aware that I *know*—I use the word advisedly—and say I *know* little or nothing of the subject I am going to speak about, and that I will not therefore attempt to lay before you a menu of solid facts, but merely an appetizer which may induce those of you whose lot it may be to labour in India or the far East, or those who go to the Universities and may become interested in the absorbing field of Oriental research, to give your attention to the unexplored fields of knowledge now laid open to us in Burma.

There will be some here who will already have felt something of the pleasures of the acquisition of knowledge. Of the acquisition of knowledge for its own sake I mean, not the mere learning which you turn into pounds, shillings and pence when you get a Scholarship or pass into Woolwich or Sandhurst, but knowledge for its own sake, as a part of the great search after truth in which we are all unconsciously engaged.

If you have not, it will, I hope, come to you later on, for without it a man is but half developed, and loses half of the enjoyment of life. It will in most cases force itself upon you. For, however delightful football and cricket and all field sports are, they are not all-sufficing. You may think that stalking the mighty ibex among the glorious scenery of the Snowy Himalayas is an entrancing occupation, and so it is. At least I think so, absolutely entrancing, but I have also, while so employed, been so hard up for something to read, that I have

read over the fulsome notices of the outside of pickle and patent medicine bottles with the greatest avidity and interest. To those of you therefore specially who will go to India or Burma, I say—remember that wherever you go—but more especially in Burma, you will be surrounded by mines of unworked knowledge. Knowledge which men will sooner or later spend much money, much time, and infinite labour in acquiring. There you will have it at your elbow.

As you lie upon a flat rock above the precipice up which your game is slowly progressing, and at which you are waiting for a shot, vast mountain sides exposed by some great convulsion of nature, lie open to your inspection. The very mental and moral qualities of your guide will be found, if you study him, to be most interesting and perplexing. In some ways you will have to confess him to be infinitely your superior, in other points you will say he has not attained to the commonest notions of morality. How much of this is the effect of religion, how much of mere growth caused by the exigencies of his surroundings? In the East you see the forces of nature in their extremes—the greatest heat—the greatest cold—the fiercest storms—the most absolute calm—mountains rent and torn, and still exposed in their native condition to man's investigation, not clothed with the accumulated débris of age, but still fresh and clear, shining marks that he who runs may read. You will be able to visit spots where the rain descends in floods—where it commences raining on a precise date and leaves off as regularly—others where rain never falls. You find yourself among people who care for nothing you reverence or think worthy of admiration—who snap their fingers at the discoveries of science, but whose victories in the field of thought very greatly outweigh our own. People whose religion is their law. Few of you will be able to understand this in its fullest sense, but I can only hope that the phrase "whose religion is their law" may remain in the memory of one or two at least. It is a most important key to the comprehensions of Eastern character. Remember it if you can. It means that every act of their daily life is guided by their religious belief. And now at last we turn to Burma—and I will begin by explaining why Burma is such an interesting country.

Central Asia — that is Thibet, Turkestan etc. — is as you probably know well, an irregular oval plateau, the surface averaging 10,000 feet above the sea. With its northern side we have no concern at present—on its western and south-western sides it slopes down gently towards Persia and Russia, on the south above India it is held up by the vast retaining wall of the Himalayas, and on the east, towards China, there is a similar great retaining wall of mountain. These two retaining walls

of mountains do not touch; there is a small gap between them, and Burma is situated just below this gap.

Now please observe the rivers which flow down from this high Central Asian plateau. On the West they flow straight away, until lost in the Caspian, or the ever thirsty sands of Turkestan and Persia.

On the South, above India, the Himalayan wall prevents their flowing straight away, and they have to creep round many a weary mile until they find a gap. The western of these two rivers, which should flow straight down on to the plains of India, is the Indus which has to go all the way round to Cashmere. The Eastern is the Brahmaputra, or as it is called in Thibet, the Sanpo.

Similarly, on the East of the plateau in China, the Hoang Ho and the Yang tse Kiang are deflected round the shoulder of the Chinese mountain retaining wall. The Yang tse coming through what we will call the Burma gap, where the Brahmaputra, as we have seen, finds its exit on the plains below.

Through this gap other great rivers force their way. The Mekong or Cambodia—the Salween, and possibly the Irrawaddy. I say *possibly* the Irrawaddy, please note this. I will return to this point later on.

Let us now turn to another subject. The high Central Asian plateau has, you know, been the starting point of numerous Mongolian hordes who have at various periods of the world's history descended upon the rich plain country below.

No satisfactory reason has yet been given for this expansion. There is still plenty of room on the plateau, which is in great part a silent desert, uninhabited save by the vast herds of wild oxen, antelopes, sheep, goats and deer, and the dense masses of ducks and geese which cover its huge lakes during the summer.

It is impossible that the climate has greatly changed, and the suggestion that formerly fertile tracts have been covered over by drifting sand requires investigation.

Whatever the cause, we know that these Mongolians, under the various names of Huns, Scythians, Tartars, and Turks, came down Westward—down the gentle declivity on that side, and are now found in Europe, Russia, Turkey and Persia.

We also see Mongolian tribes settled in Burma and Siam, who have undoubtedly come down through the gap in the mountains I mentioned a short time ago. How the Mongolian tribes are distributed in China we do not yet know, but we know that many have come round the northern shoulder of the great Chinese retaining wall.

There are no Mongolians in India. The great Himalayan wall has kept them back. Similarly under the Chinese mountain wall, though the greater part of the country is filled with Mongolians, there are tribes of whom we have only lately received accounts, who, whatever they are, are not what we usually accept as Chinese.

You will see that I directly connect the course of the rivers which flow down from High Asia with the movement of the Tartar (Mongolian) tribes. It is only a suggestion, a theory, but some of you may find it a useful indication of the teachings of Geography at some future time in your lives. Burma, then, lies below this gap, through which rivers and nations have found their way on to the fertile plains below.

The course of these rivers is unexplored, the movement of these tribes uninvestigated. I need not point out to you what a field of enquiry this tract therefore offers, both to the Geographical explorer and to the student of national history. Besides this, Burma is on the border-land of one of the great climatic systems of the world.

The regular monsoons, or moisture laden gales, which almost to a day every year come to India from the South West, meet in this region the somewhat similar but as yet uninvestigated climatic systems of China. Here the trees and plants and animals of India and China meet, and can be studied side by side. Here we are on the frontier of Buddhism, a religion which has produced a completely different mental development to that produced by the system of caste (the Hindoo system) in the minds of its followers.

The question "what is civilization?" can here be studied in a new form, for the Burmese and Chinese are in some respects highly civilized.

The British possession of Burma consists of two portions—Burma proper and the Shan States lying side by side—the latter being to the East. It should also in my humble opinion, for reasons which I will mention later on, include the great mass of hills which lies between India and Burma proper, but this tract is still almost independent, and such dealings as we have had with the inhabitants, having hitherto been conducted from India, it has not yet at any rate been included in the satrapy as I may call it, or province of Burma.

Burma proper, then, consists of a long trough running north and south down which run the two rivers Irrawaddy and Chindwin. You have probably never heard of the Chindwin, yet it is a great river, navigable for many hundred miles by steamers of a fair size.

The Irrawaddy is navigable for 1,000 miles by large steamers four hundred feet in length, (the largest vessels of the P. and O. Company are four hundred and fifty feet in length).

The lower part of this trough or valley (I prefer the word trough, however as it is a flat bottomed space with perpendicular sides and not an ordinary valley) is in great measure blocked up by a range of hills which runs down the centre, leaving two comparatively narrow channels one on either side.

The Irrawaddy, you see, does in the North, run down the Eastern side of the trough, the Chindwin down the Western side, but the Irrawaddy on reaching Mandalay suddenly transfers itself to the Eastern side, receives the Chindwin and makes its exit down the Western side. Now the question arises, did not the Irrawaddy at one time flow continuously down the Eastern side? From what I have seen of the country there are numerous instances of a sudden transfer of a river from one drainage to another, within this extraordinary country. I think there is sufficient to warrant any one in pursuing the investigation. The floor of the trough which constitutes Burma proper is, generally speaking, undulating, and contains ranges which would in England be termed mountains, but are there in comparison with their surroundings considered hills. There are only three isolated peaks, one of which we know to be an extinct volcano. The others, by the descriptions I have received from natives, are also extinct volcanoes.

In the North, where the rainfall is heavy, the ground is covered with immense forests full of wild beasts of every kind. In the centre, where there is little rain, and at one point none at all or practically none, perhaps one shower in three years, the country is covered with palm groves and thorny scrub jungle. In the extreme South, where the rainfall is heavy, again there are great rice tracts and forests.

The Shan states are placed upon a great broad plateau sloping gently down from North to South, till lost in the rich alluvial plains of Siam. Its Western edge, which is vertical for hundreds of miles, forms the side of the Burma trough. Along its Eastern side runs in a deep narrow gash or rift the river Salwin.

In the North, the plateau is narrowed by the valleys of the Taping and the Shwili River which join the Irrawaddy. Geographers formerly believed that the Sanpo or great river of Thibet joined the Irrawaddy down either one or other of these valleys, but visits to these rivers, which are comparatively speaking small, have dispelled this belief, and modern research has identified the Sanpo as one with the Brahmaputra almost without doubt.

The tract between Burma and India is a mass of parallel mountain ranges running North and South, rising in the North to a height of 18,000 feet above the sea, and falling gradually in altitude until the sea is reached. In a straight line between Calcutta and Mandalay the range is about 8,000 feet above the sea. A little more than half way up, and enclosed within the folds of the mountains is the small upland valley of Manipur. I may mention here that Manipur is a Hindoo name for the country. Its native name is Cathay, which brings back to our memory the couplet

"Better fifty years of Europe
Than a cycle of Cathay."

I understand that the word Cathay is not known in China, to which country it is generally applied by Englishmen.

These mountains are covered with forests, and abound with game. The rivers, which flow in narrow gorges, to whose rocky sides cling palms, tree ferns, graceful cane and the feathery bamboo, are full of fish, and offer the most exquisite scenery it has been my good fortune to see. I may remark in parenthesis, that it is not until one has left school and seen the cane in its natural state, that one learns to appreciate its gracefulness. The trunks of trees in this tract are covered with orchids, gaudy toucans swing in the branches, and troups of black apes with white faces make the whole forest ring with a diabolical chorus of "Hooluck, Hooluck."

This tract is inhabited in the North by a race called Nagas. Though they are perfect savages they have attained considerable celebrity. The Hindus believe them to be and describe them in their ancient book, the Mahabharata, as a kind of winged serpent creatures of superhuman powers. Certainly a Naga warrior in full war paint, feathers and tassels of human hair, dyed blood red, is a terrible and gorgeous object, and would compete on level terms with Sitting Bull or any other North American Indian Chief; but his superhuman powers are now limited to an extraordinary facility for putting down neat whiskey.

But the Naga has attained celebrity in another place. I find in Johnston's Classical Atlas, at this very spot on the earth's surface, the word Naga logæ—now the word "log" means people—Naga log means in Hindustani the Naga people, the 'æ' diphthong is evidently a classical affix, and as I understand that the authority for the word is Herodotus, we are led to believe that while the great Empires of Greece and Rome, of Persia and Hindu India have passed away, the Naga still holds his own. Two thousand years hence he will probably be there still, as no one covets his country, and he resists the civilizing influences of trowsers and moral pocket handkerchiefs. We tried once to civilize the Nagas by making soldiers of them. This process,

though not usually considered civilizing in England, is so in the East, strange as it may appear. With this object we got a Naga Chief to come and watch the men drilling—he looked pensively for a long time at the goose-step, and other performances with which soldiers usually while away their time, and at last on being appealed to, to say whether any of his braves would enlist—he replied with sadness—"Ah, I should like them to come, but they could never learn to dance like this." I may explain that the only Naga war exercises are war dances of an exceedingly picturesque and animated nature.

The language has only lately been studied, and it is not known whether the Nagas are Aryan or Mongolian. I imagine myself that they came of an Aryan stock. There is geological evidence to show that at one time the hills inhabited by the Nagas were very lofty, and covered with snow and ice. There are stream-worn boulders on the tops of the hills, and huge masses of rounded stones evidently thrown out by glaciers. The trees and plants too on the tops of the hills are of an Alpine nature, and allied to those found on the Himalayas. It is evident that this region has settled down, and a stream, which once flowed South into the Manipur Valley, has had its source reduced below the level of its bed, and now flows North. The débris from this Alpine region, was sent down, accumulated, filled up two contiguous valleys to a depth of some 2,000 feet, and formed the elevated valley of Manipur.

The Manipuris are Hindus in religion though Shans by race. The country is chiefly remarkable for having taught us the game of Polo. It is the national pastime, as cricket is, or was, with us. Some years ago a prince was exiled with his followers to India. In India he kept up his national pastime, and it was taken up by officers of the Bengal Cavalry, and through them introduced into England. I have also played the game with the tribes who inhabit the valley of the Upper Indus—the next great exit on the west from the highlands of Central Asia. South of Manipuri there are hills inhabited by a race called by the Indians Kookies and by the Burmese, Chins. They are a bloodthirsty, uncivilized race of savages of Mongolian origin. In appearance, face and figure, they are exactly similar to the Burmese, and the Sanskrit professor at the Rangoon College, a German of great erudition, named Förchhamnen, identifies them by language tests as a branch of the Burmese.

Before I leave this side of Burma I must mention that the Naga Hills are full of the most grand and wild mountain scenery. The highest peak rises to 12,000 feet above the sea, and several of the peaks are covered with snow in winter. There are great herds of wild elephants and bison on the hills, countless deer

in the valleys, and many kinds of pheasants in the forests—one, the Tragopan Blythii, is most gorgeously coloured, and twice the size of the English pheasant, another is a brownish grey and covered with peacock eyes. It is called the Polyplectron. Space will not permit of my telling you of the Nagas, their brilliant and picturesque dresses, their war dances, their government by elders and communal system, of the great villages built on the tops of the hills to prevent surprise by an enemy, how they eat dogs and quaff huge horns of cider, made from rice, sitting round on great flat stones placed at the highest part of the village, while the girls and young men dance in the centre. How the Chins are morose and gloomy as the Nagas are cheerful and bright. How I have heard them, hundreds together at night, in the black gloomy aisles of the forest lighted up by the red light of the camp fires, chanting the bloodthirsty deeds of their heroes in deep bass tones. Unless a Chin has a nice collection of human skulls his father and mother are ashamed of him, and the girls of the village call him a milksop.

His brother the Burman is more civilized. It is true that King Theebaw had to be removed because he would keep on murdering his relations, but this is not usual. It is looked upon as a royal privilege. The present capital of Burma is Mandalay. It used to be Ava, and Burma used to be called, not many years ago, the Kingdom of Ava. Ava is now a ruin situated 12 miles further down the Irrawaddy than Mandalay. Between them is the site of another abandoned capital called Amarapura, or the Immortal City. On the opposite side of the river is a fourth. Higher up the river there are several, and lower down the river there is one called Pagan.

Mandalay is a magnificent town of 150,000 inhabitants. It is laid out in great broad streets, laid in squares like American cities. Rows of trees line either side. In the centre is the city proper, a square of a little more than a mile in length either way, enclosed by a huge wall, sixty feet high, and a moat outside 50 yards broad. There are two gates and one bridge on each face. The court people lived inside the city, now all have been turned out and the space is filled with houses for officers, barracks for troops, etc. In the centre of the city is the palace surrounded by a high brick wall and a palisade of teak logs. The palace buildings are placed upon a six feet high plinth of brick, and built on the plan of two T's with their feet placed together. The head of one T being the Great Audience Hall, the bodies of the T's being the Throne room and Royal Apartments, and the head of the other T divided off into the rooms of the Queens of the North, South, East, and West, as they were called.

Behind this came two rows of large buildings occupied by the King's sisters, cousins, and aunts, and behind that again the First Queen's throne-room—the King's throne-room and great audience hall being on the East—the Queen's throne-room on the West.

On the North and South were gardens very beautifully laid out with ornamental water, and wonderful rockeries representing mountains, on which were perched little kiosks.

The Palace buildings are of wood, of great size, and very richly carved, and covered inside and out with gold leaf. Immediately over the King's throne stands a graceful seven-roofed spire—like the rest of the palace, beautifully carved and gilt, and surmounted by a shaft of glass. Enclosed between the buildings there are courtyards shaded by magnificent trees, to which small exquisitely carved gilt shrines, fountains and gold-fish ponds gave a brightness and charm, which were very attractive on a hot, Eastern summer day.

As the Burmese dress in the most brilliant colours, love masses of flowers, and are continually having festivals or theatrical performances, the court must, before our arrival, have presented a collection of really very beautiful pictures.

A vote of thanks to the lecturer was proposed by Mr. Penny.

Saturday, March 23rd.

The President gave a lecture on "Vision," illustrated by experiments.

There are three distinct kinds of perception involved in sight. First there is the perception of outlines on a flat surface which may be perceived with one eye as well as, often better than, with two; then there is the perception of solidity or depth—the relative distances of different objects—which can be perceived far more surely with two eyes than with one; and lastly there is the perception of colour.

All objects that are visible are so in virtue of rays of light which proceed from every point of the object, their course whilst moving through the same medium being always in straight lines. If a screen be placed so that any point on it is illuminated by rays proceeding from one point only on the object, then an image of the object will appear on the screen. This isolation of the rays can be effected either by allowing only those rays from the object to fall upon the screen which pass through a very small hole between the object and the screen or by placing a lens at a particular position in the path of the rays. If

however the hole be not very small, or if the lens be not in the proper position, the same point on the screen will be illuminated by rays from different points on the object, and a series of overlapping images will be formed which will be either blurred or totally indistinguishable. When the image is formed by a properly adjusted lens all the rays which fall on the lens from any point of the object are so bent on passing into and out of the glass as to fall upon the screen at nearly the same point, the image formed in this case is consequently much brighter than when only those rays are allowed to pass which fall upon a small hole.

In the human eye the rays are bent chiefly by the crystalline lens and brought to a focus on a screen called the retina. The retina is a complicated structure, one of the most important layers of which is composed of an immense number of very fine fibres, each of which is connected with a very small rod or a very small cone, these rods and cones forming a kind of mosaic at the back of the retina. It is in these rods and cones that conscious sensation first commences, the message being carried from them through the fibres, which collect into a bundle forming the optic nerve, into the brain. These nerve fibres, by whatever cause they may be excited, always convey the impression of light which explains why we "see stars" when we receive a blow on the eye. There is a small yellow spot at the centre of the retina from which all the layers except the fibres terminating in the rods and cones are absent. This is the part of the retina with which we see most distinctly, the only part with which we see very small objects, and when we "look at" an object we adjust the eye in such a way that the image of the object is formed on this part of the retina. Comparatively large objects may be seen indistinctly with other parts of the retina.

Where the optic nerve pierces the retina there are necessarily no rods and cones: this part of the eye is blind. The existence of the blind spot may be shewn by cutting two small circular discs, about the size of a sixpence, placing them on a table about three inches apart, shutting the right eye and holding the left eye directly over the disc on the right about eleven inches from it. If the disc on the left is still visible a small motion will cause it to disappear. In performing this experiment the left eye must look steadily at the right disc and on no account be directed towards the left disc.

When a lens is placed in front of a screen it will form distinct images on the screen of objects at only a particular distance from it, but the lens of the normal eye can form distinct images on the retina of objects at all distances greater than five or six inches. This "accommodation" of the eye, as it is called, is

effected mainly by an alteration of the curvature or roundness of the lens. When the eye is at rest it forms distinct images of distant objects; by contraction of certain muscles the lens can be made thicker and more rounded and then nearer objects will be rendered distinct. In some eyes however either the retina is too far from the lens, or the lens can never become flat enough for distinct vision of distant objects. Those with eyes thus constituted are said to be short sighted because, unless aided by concave glasses, they can see near objects only. In old age the eye loses its powers of accommodation and distant objects only can be seen distinctly. To enable those who suffer in this way to see near objects convex glasses are necessary. It is very important that young people should not strain their eyes by reading or working in a bad light. By so doing they may render themselves permanently short sighted.

When we use two eyes two pictures are formed, one on each retina. How these are united into one is uncertain, but it is certain that to every point on one retina there is a corresponding point on the other, and that if the two pictures of an object are formed on corresponding points, they will be seen as one, but if they are formed on points which do not correspond, the object will be seen double. The fact that we do see the greater part of external objects double is hard to realise at first as we have all our lives been educating ourselves to neglect these double-images, but with proper care and a little trouble almost any one may convince himself of their existence.

When we look at a solid object at not too great a distance the two pictures will differ slightly the right eye seeing a little more of that side of the object towards our right and the left eye a little more of the other side. Long experience has convinced us that when an object does present pictures to the two eyes which differ in this way then it is a solid object, and consequently when different pictures of an object are formed on the retinas we gather them up into the mental conception of a solid. That this was really the case could only be conjectured before the invention of the stereoscope, but now by placing in the two compartments properly adjusted and slightly differing flat pictures, we may produce an impression which cannot be distinguished from that produced by a really solid object.

The perception of colour introduces quite a different set of phenomena which were very briefly considered. The compound nature of white light was shewn by means of the spectrum, and it was also shewn that the colours of bodies were due to their stopping or absorbing some of the rays which fall upon them while they transmit or reflect others. The causes of our perception of colour are conjectural. According to Dr. Young's

hypothesis the fibres of the optic nerve with their terminal rods and cones may be divided into three groups. One of these is excited most easily by rays of red light, another by green and the third by blue light. When both red and green nerves are excited we call the sensation yellow, the sensations of other colours being similarly produced, white light exciting all three sets of nerves.

The more usual phenomena of colour blindness which afford some confirmation of this theory may be explained by supposing those affected to have only two sets of nerves, the green and the blue, and we may throw ourselves temporarily into a condition closely resembling theirs by thoroughly tiring the red nerves so that for a time they almost refuse to act. This may be effected by staring at a strong light, such as that of the sun, through a piece of red glass for ten minutes. The lecture concluded with some experiments showing how the nerves on a particular part of the retina might be tired after which, on looking at a surface uniformly illuminated, the part corresponding to the tired nerves would, if the tiring had been general appear darker than the rest, if the tiring had been for one colour only it would appear of the complementary colour.

A vote of thanks to the lecturer was proposed by Mr. Kempthorne.

Saturday, April 6th.

A. S. Flower, Esq. gave a lecture on "Architecture as a hobby and as a profession."

The lecturer commenced by saying that to take an interest in architecture made a great addition to the pleasures of life; its enjoyment required no special gifts, and was almost independent of season or place. It was a convenient hobby, because to find architecture we had not to go out of our way; it was always about us; we could not avoid it if we would: our choice was to view it with apathy or with interest. If we did the latter we would find something to look at, seek for, think of, talk about, remember, wherever we went; we would never lack objects for walks or occupation for spare time; we would become excited about all sorts of little things which otherwise we would never even notice. The taste was valuable if only as a remedy for that dulness of which most men complained whenever they had neither sport nor work; but to some it would prove an unfailing source of real delight. It was besides a subject of which no educated man should be ignorant. It dealt not only with the history of old buildings, but with their preservation and adaptation to present uses, and with the

building of new ones. What had this to do with them? There was hardly one there, whatever his profession, who would not sometime find himself concerned with the erection or maintenance of buildings; it might be directly, *e.g.* as an R. E. officer, or it might be indirectly, in any number of unexpected ways; and when that time came it would be of great advantage to themselves and every one else if they entered on their responsibilities with some small but sound knowledge of the subject. The character of our architecture was not a thing to be left to the profession alone, but was of public importance: material surroundings greatly influenced men's lives, and it was the duty of every one who cared for his fellow to do his best that all about him should refine and elevate rather than depress and deaden. In the present state of public indifference, bad architecture prevailed everywhere, to the detriment of mental and moral no less than of physical health; and it must be so till the public attitude was changed.

To have good architecture, and that meant to have all surroundings good and wholesome for mind, body and soul, there must be much greater interest, showing itself in intelligent criticism, from outside; and as this could not be suddenly created, he asked them as representatives of the leaders of public opinion in the next generation to begin soon to give some thought to such matters. It might help them to say that there was no mystery about architecture: it was not all intricate mathematics, or pedantic rules, or dry antiquarianism, as some suggested; nor was it only sentiment and romance as others taught; nor was it a trivial affair of passing fashions and individual whims; it had definite principles and limits; and any one could get a fair knowledge of it by the use of his own eyes and common sense without either deep reading or extensive travel.

He had not found a quite satisfactory definition, but would call it 'the science and art of building so as to combine strength, fitness, expression and beauty.' A critic should avoid all questions of style or associations, and simply consider whether a building possessed those four qualities, *i.e.* were its materials well chosen and well put together, was it well adapted to its uses and positions, did it express its construction and purpose, did it show throughout a love of beauty? if so, however small or plain, he might call it good; but if not, whatever else might be said of it, he must call it bad architecture.

Anyone who cultivated such a judicial mind, would soon feel that the new power of rational enjoyment of good work amply repaid him for checking his natural propensity to vague wonder and indiscriminate admiration.

So let him begin with the nearest buildings and seek reasons for everything about them. He should try to realize the circumstances of their erection, and should debate how and why they came to be in their present state, what was the use and meaning of each arrangement and feature, and wherein they resembled or differed from other buildings. Then, continuing to examine and compare wherever he went, he would notice buildings erected under other conditions, for other uses, by other peoples, and would be led to trace how the various forms which architecture took were brought about, till he would find he had a key to the understanding and appreciation of the styles of every age and country.

But there was something to do besides merely looking at buildings—there was making drawings of them. Looking with a view to drawing fixed the object in the memory, and brought out points which would otherwise escape notice; while, however rough or poor the sketch, it was something permanent to carry, away, which time and distance made more and more valuable.

With the help of the black board the lecturer gave some useful and practical hints on sketching, illustrating the chief rules of perspective with a few simple examples, and shewing how a few lines roughly drawn in a note-book, in less than five minutes, might serve to recall all the important features of a building, and concluded a most interesting lecture by reading extracts from various authors from Vitruvius to Sir W. Chambers giving a list of the necessary qualifications of an architect so long that it seemed almost impossible that all should ever be found in any one person.

A vote of thanks to the lecturer was proposed by Mr. Davenport.

Saturday, May 25th.

The Rev. C. W. Penny opened a discussion on "How and what to observe."

Mr. Penny spoke first of the greatly increased interest and pleasure which the acquirement of the habit of observation gave to an ordinary country walk, which to one person might be dull and aimless, whilst to another it would abound with interest. He enlarged also upon the advantage of making notes at once upon all objects of interest, shewing how this both tended to increase the accuracy of our observation at the time, and served as a permanent record, offering an effectual remedy both for failure of memory and for unintentional

exaggeration, to one or other of which we are probably all liable. He illustrated his remarks by extracts from his own notes made during the immediately preceding fortnight, and also passed round several interesting natural objects for examination. The discussion was continued by Mr. Bevir, Mr. Williams, A. C. Deane, F. H. Wolley Dod, L. S. Downes and several others, and the proceedings closed with a vote of thanks to Mr. Penny proposed by the President.

Saturday, June 8th.

J. L. Bevir, Esq. gave a very amusing and interesting lecture on "The Land of To-morrow."

This is the North-West part of Spain, which he called "The Land of To-morrow," first, because unlike ourselves the inhabitants never do to-day what they can put off till to-morrow, and secondly, because the country itself is capable of infinite development, so that it may well be called the land of the future. As to route you can go overland across France, but it is best to go all the way by sea; but even then there are inconveniences, as in the case of Mr. Bevir, who had to wait a whole day for the Spanish captain, the boat not being able to leave Gravesend until his arrival. In three days they reached St. Sebastian, a town famous in the Peninsular war for its siege by the Duke of Wellington. Hence they coasted along to Bilbao, and left their ship finally at Santander. From this point they made for the mountains, taking the railway as far as a small place called Torrelavega, and then by coach, a precarious mode of travelling, till they reached Panes, a small village at the mouth of a pass on the river Deva. Here they stayed some time and Mr. Bevir described the village and its inhabitants, at either end a church, and between them a straggling street with shops to supply the possible needs of the inhabitants, and in the centre a square where the villagers dance on Sunday afternoon. The chief magistrate in the village is the Alcaldi, whose powers are nominally very great, but in reality governed by many considerations, that of money not excepted. As to the character of the people, even the commonest, the lecturer said, were courteous, independent and generous, with the one exception of a passionate love of hoarding small amounts of money. Mr. Bevir narrated their adventures up in the mountains, and then described their return to Santander, their coasting thence to Bilbao and their sufferings in a boat laden with ore which bore them back through rough weather in the Bay to Newport.

After the lecture Mr. Goodchild proposed a vote of thanks, which was enthusiastically carried and the meeting adjourned.

Saturday, June 29th.

H. M. Elder, Esq. gave a lecture on "Bubbles" of which the following is an abstract.

Trivial as it may seem at first sight a soap bubble is a most instructive as well as beautiful object. From the gorgeous play of colours over its surface we have learned much about the theory of light, while from some of the properties in virtue of which it resembles an elastic skin, we may learn a great deal about the nature of fluids. A soap bubble consists of a thin film of liquid and is therefore bounded by two surfaces. The quantity of liquid is so small that its weight need hardly be taken into account so that in considering a bubble we have merely to consider these two surfaces very near to each other.

The properties of a liquid at its surface are somewhat different from those at any other part. *E.g.* water may be carried in a fine meshed sieve if the wires are well greased, for there is a certain resistance to breakage of the surface, or the surface possesses a certain amount of strength. There are many ways of illustrating this property; a needle will float if gently lowered on to the surface of water; the hand can be dipped into water without being wetted if lycopodium dust be strewn over the surface first; the same thing can be shewn by the rough treatmeant that soap bubbles will often stand before they break. Thus it is easy to blow one inside another and roll it about or even pull it out of shape by drawing out the outer bubble so as to compress it, or again a bubble may be tossed about on a piece of flannel and yet will not burst.

This surface possesses another kind of strength. It can exert a pull, in fact a soap bubble can be arranged so that it will even lift a weight. Faraday succeeded in blowing out a candle with the jet of air caused by the contraction of a bubble that he had blown on the end of a tube driving the air out through the tube.

This property of a liquid surface is called its surface tension and it is measurable without much difficulty. Water is found to have the greatest surface tension of any ordinary liquid. Soap solution has only about one third as much as water. This is the reason that when soap suds are dropped on to clean water they fly out in all directions. Alcohol has a less surface tension than water hence since the wine on the sides of a wine glass loses alcohol by evaporation faster than the bulk, it pulls a portion up after it, until a drop is formed which falls back into the glass. This is Prof. James Thomson's explanation of the well known phenomenon called "tears of strong wine."

Another property possessed by some liquids is "surface viscosity." We cannot blow a bubble with water alone on account of its small surface viscosity, hence we mix soap and glycerin with it. These reduce the surface tension and on that account increase the difficulty of blowing the bubble but increase the viscosity and so enable us to form a bubble. Saponin solution possesses extraordinarily great surface viscosity, so great that the tension is not sufficient to pull a saponin bubble together when open to air, and if even the air is sucked out it folds like a piece of cloth instead of drawing itself together as a soap film does.

Oil has small surface tension and great surface viscosity, hence a few drops thrown on to water are instantly pulled out by the great surface tension of the water and form a thin film over it, which having great surface viscosity prevents the waves from breaking. This is the explanation of the effect produced by "oil on troubled waters."

One of the most important properties of a liquid is that at any point within it the pressure is the same in all directions. This applies equally well to a liquid film so that we may say that in a liquid film the surface tension is the same in all directions. One of the consequences of this is that if liquid films meet they always meet three along a line, and another is that when no air is enclosed in a film the curvatures of the surface are equal and opposite in two directions at right angles to each other. The result of these laws is that when a wire frame of any shape is dipped into a soap solution there is found to be a surface, more or less complicated according to the shape of the frame, spread upon it. A screw surface is one that has zero curvature, hence if a helix of wire with a central axis be dipped into the solution a perfect screw surface will be formed on it.

Many other things have been learned from the study of surface tension and liquid films, but perhaps Sir Wm. Thomson made the most wonderful application of the knowledge acquired from it when he used it to calculate approximately the size of the ultimate atoms of which matter is composed.

The proceedings closed with a vote of thanks to the lecturer proposed by Mr. Kempthorne.

Saturday, July 27th.

A. C. Deane read the Essay for which the Pender Prize had been awarded. The subject was "The Frog."

The Frog offers several advantages as a subject for study. It

can be found almost anywhere, and there is no animal which presents a wider or more interesting field for research in its development and life-history.

The Frog is a singularly unfortunate animal. Among human beings he is looked upon as only less obnoxious than the toad, while he falls the ready prey of bird, fish, and snake alike.

There is only one species of Frog indigenous in Britain (*Rana temporaria*). On the Continent, in addition to this, there is another abundant species, the hind-legs of which are used as articles of food, whence it has received the name of the "Edible Frog" (*Rana esculenta*).

The external appearance of these two species was then noted, and reference made to the fact that not only does the colouration of different frogs of the same species differ widely, but also the same frog will be found to change its colour under the influence of fear or of strong sunlight.

The front-legs of the Frog have four 'toes' each, and the hind-legs five, while the hind-feet are webbed like those of a duck, which is not the case with the front pair. In this thin membranous web, we may witness, under the microscope, the circulation of the blood through the veins and arteries.

The structures of the eye, ear, and olfactory organs in the Frog were next described and illustrated.

It is worthy of note that the senses of seeing and hearing are greatly developed in the Frog. But in the sense of smell they are greatly deficient. The writer had found, from numerous experiments, that nothing less pungent than the strongest Ammonia or Carbon Bisulphide was perceived by them at all. Probably the explanation of this is, that this organ is the least essential to the existence of the Frog, and hence has been least developed.

After noticing the various nerves in the legs, various dissections were shown, exhibiting the position and nature of the heart, liver, and other internal organs.

Attention was then turned to the life and habits of the Frog. It belongs to the class Amphibia, that is to say, it lives both on land and water. Both are essential to it, for it cannot live on land without a plentiful supply of moisture, neither can it live in the water without coming to the surface to breathe. It feeds almost entirely on insects, especially the small Diptera which hover about lakes and ponds. If these fail, however, it eats slugs, snails, worms, and even its own young with the greatest relish. It is a useful animal to have about a garden, as it will destroy great quantities of the smaller insect pests.

The history of the development of the Frog is very interesting, as in its early days it is a true Fish, breathing by means of gills; and in every way as much a fish as the Salmon itself. And when it grows up it becomes an air-breathing animal no less than the elephant, breathing air by means of lungs.

The various stages in the development of the Frog, from the first segmentation of the ovum, were then described and illustrated, and the essay concluded with an account of the mode of preparation of the various stained and injected preparations with which the paper was illustrated.

After the Essay had been read Mr. Carr spoke a few words reminding the Society that the Prize was founded to keep alive the memory of his old pupil and friend Henry Denison Pender, who was one of the first and one of the most energetic members of the Society, and one whose scientific tastes, which had seemed destined to lead him to distinction had his life been spared, were probably developed by the Society. He also expressed the high appreciation both of the audience and of himself for the Essay which had been read and his sympathy with the Author, who, just as he was leaving the School after a most successful career, had lost all his prizes in the recent fire.

Saturday October 5th.

The Rev. P. H. Kempthorne gave a lecture, under the auspices of the Photographic Section, on "Picture Making by Photography."

He dealt with some elementary principles of composition by way of helping beginners in Photography to produce a pleasing picture. It was untrue that a Photographer must take a picture as he finds it. The choice of a point of view to be gained by moving the Camera a few yards might make all the difference between a satisfactory result and the reverse. The placing of a figure, the selection of the time of day, the capture of a special effect of light might be all important. The chief elements in the production of a pleasing composition were: 1. The direction of the principal lines. 2. The arrangement of the lights and shades. The former was to be the subject. The fundamental laws of composition viz. Balance, Contrast, and Unity, were dwelt upon at some length with many illustrations from Lantern slides lent for the occasion by Mr. Elder. A few remarks followed upon the necessity of care in choosing appropriate figures in views of landscape. In conclusion the Lecturer said that no one could be expected in actual practice to be thinking of the rules of composition when taking a photo-

graph. He recommended the critical study of good pictures and the application of such rules to determine why these satisfy the eye. Let pictures be studied in comparison with nature and the result would soon appear in the critic's own work.

At the conclusion a vote of thanks to the lecturer was proposed by Mr. Hagreen.

Saturday, November 9th.

C. E. Williams, Esq. gave a lecture on "Colour."

To shew what the absence of colour in nature would mean a spirit-lamp was lighted—the wick having been well sprinkled with Bicarbonate of Soda. Everything appeared in light and shade only, the most gaudily coloured Christmas Cards looking like drawings in Indian Ink.

Newton's experiment shewed that (*a*) white light is composite—made up of various coloured rays (*b*) that each colour is refracted by the prism at a different angle (*c*) that each of these colours is pure *i.e.* cannot be further split up.

It was further shewn that these colours of the spectrum can be re-combined into white light (*a*) by a second prism (*b*) by a cylindrical lens (*c*) by a series of mirrors reflecting all the colours to the same spot (*d*) by causing the spectrum on the screen to oscillate rapidly enough to combine the impressions on the retina (*e*) by a rotating disc with coloured sectors.

It is customary to speak of seven spectral colours but there is really an unbroken series from one end of the spectrum to the other. All colours in nature are either these colours of the spectrum or combinations of them. All hues of pink or purple may be matched by adding rays from the red end to rays from the violet end. Red and green make orange. Green and violet make blue. White also, as well as being formed by the combination of the whole spectrum, may be made by two or more properly selected rays. Two rays that form white are called complementary. These facts were illustrated by experiments with the rotating disc and also by the combination of different portions of the spectrum by means of mirrors.

The theory of Helmholtz and Maxwell with regard to the perception of colour is that the eye is provided with three sets of nerves, one tuned, as it were, to a certain red, one to a green probably an emerald green, and the third to a violet-blue and that they are also sensitive but in a rapidly diminishing degree to rays on either side of those which affect them most strongly. According to this theory the sensation, for example, of orange is

the sensation of having what we may call our red and our green nerves equally affected and we can understand how the pure orange of the spectrum which will slightly affect both our red and our green nerves may appear the same to us as a composite orange which is made up of red and green. And, according to this theory, colour-blindness is due to one or other of the three sets of nerves not being normally sensitive—the most common form of it, red blindness, being caused either by a want of sensitiveness in the red nerves or an excessive sensitiveness in the green and violet nerves.

Colour in nature is produced by the destruction of colour as it is in painting with transparent washes of water-colour: when the rays of the sun fall on a piece of red cloth all the spectral colours of white light are absorbed except the red rays which are reflected and reach the eye; if we look through a piece of ruby glass the only rays that reach the eye are the red ones, the glass being transparent to them, but opaque to all the others.

To illustrate this, various coloured glasses and liquids were analysed by the prism to shew which rays were absorbed and which passed through—a yellow glass for example stopped all the blue and violet and was transparent to red, yellow and green, the combined effect of which produced the sensation of yellow. Violet ink is transparent to red, blue and violet, yellow picric acid to red, yellow and green; if we pass white light through both of them all that is left is red, a result that without this analysis would be inexplicable. The same two colours, combined on the revolving disc, give white.

The phenomena of simultaneous and successive contrast come under the head of optical delusions. If the screen be illuminated by both electric light and gas light and any object be interposed between it and the gas, the shadow, which is really white, being illuminated by the electric light only, will appear by contrast blue, the complementary colour to the yellow light of the gas on the rest of the screen. A bright patch of colour always appears surrounded by a halo of the complementary. The same thing was shewn by squares of coloured cardboard in the centre of each of which was a star of neutral grey. The star in the vermilion card appeared greenish grey, that in the yellow card bluish grey, and that in the blue card yellowish grey.

In successive contrast the result appears to be due to fatigue of the retina. According to the theory of the perception of colour if the eye is exposed for some time to, say, a bright red light the red nerves become weary, and if a white object be then presented the green and violet nerves will be affected as usual but not the red nerves; the sensation therefore is that of a mixture of green and violet *i.e.* some tint of greenish blue, the

complementary to the red. The familiar experiment of Pears' Soap was shewn with the lantern and concluded the lecture.

A vote of thanks was proposed by Mr. Davenport, who expressed a hope that, if we have to go to war again, our enemies may be colour blind to red.

Saturday, December 7th.

H. M. Elder, Esq. gave a lecture to the Photographic Section on "Photographic Printing with Platinum," of which the following is an abstract.

I need hardly say that we know many substances which are sensitive to a greater or less extent to the action of light, *i.e.* in which a chemical change is produced by the impact of light waves. I do not propose to go into this question to-night but merely to give you a short account of one method by which this property may be used to produce permanent pictures, and to point out practically some of the difficulties that arise, and shew you the best method of working. To do this I will first explain the nature of the process we are going to consider. It is called the Platinotype Process because the resulting image consists of very finely divided metallic platinum; but, though platinum compounds are themselves slightly sensitive to light, the substance acted on by light in this case is not platinum but a salt of iron. Most of you are aware that there are two classes of iron compounds. The chemical difference between these is that for a given quantity of iron one class contains a larger proportion of oxygen or its equivalent than the other. These are distinguished by the names ferric and ferrous salts.

Ferric chloride $= Fe_2Cl_6$.
Ferrous chloride $= FeCl_2$.

Now the Ferric salts are *oxidizing* agents, *i.e.* they are ready to part with a certain portion of their acid to bodies in their neighbourhood, so becoming '*reduced*' to ferrous salts. The Ferrous salts on the contrary are powerful *reducing* agents, they easily seize on oxygen or any acid in their neighbourhood taking it away from its former combination and forming ferric salts.

Certain ferric salts are affected by light under suitable circumstances, becoming actually reduced at the expense of the surrounding oxidizable bodies, and converted into ferrous salts, when they would be unaffected in the dark. These ferrous salts have the property of being able to attack various other metallic compounds, notably the salts of the so called noble metals, reducing them to the metallic state. Thus it is possible to arrange a sort of cycle of operations thus: Place a ferric salt in

such a position that it may be easily reduced, that is in contact with an oxidizable body, and expose to light, a ferrous salt is formed, then treat this with an easily reducible metallic salt, a ferric salt is again formed and the metal deposited. The first part of this process is the basis of the well known blue printing processes called Cyanotype. The blue colour that is formed being Prussian blue, which is made either by the reaction of a ferric salt with ferrocyanide of potassium or a ferrous salt with ferricyanide of potassium.

The part of the easily oxidizable body is usually played by the sizing of the paper, and for all these processes the paper is generally very carefully sized with starch or sugar or some other easily oxidizable organic substance.

There are three processes of Platinotype printing in fairly common use. Two of these, known as the Hot Bath and Cold Bath processes, are due to Mr. W. Willis of the Platinotype Company, and one to a German gentlemen, Captain Pizzighelli. This last I do not propose to shew you.

In the Pizzighelli and Willis' Hot Bath processes the paper contains the requisite platinum salt, a chloroplatinite of potassium, that is a compound of the chloride of platinum $PtCl_2$ containing half as much chlorine as the well known platinic chloride $PtCl_4$, and therefore called platinous chloride. This is used because it is more easily reduced to metal than the platinic chloride. The paper is prepared by smearing evenly over it a mixture of the requisite iron salt, ferric oxalate, and potassium chloroplatinite and drying with heat. The paper is then exposed to light under a negative and the appearance of the image, which is quite indescribable, is a guide to the amount of exposure. The iron salt has now been partly reduced, but in Willis' paper it does not yet reduce the platinum salt because the ferrous oxalate is as yet in the solid form, and so cannot reach the platinum salt. Now ferrous oxalate is insoluble in water, but is easily dissolved by a solution of potassium oxalate so to bring the image out or '*develope*' it, it is necessary to float the print on a hot strong solution of potassium oxalate which dissolves the ferrous oxalate. In the act of solution this reduces the platinum salt and the image is deposited in platinum black on the paper. To print successfully with this paper it must be kept absolutely dry until it is developed as any dampness tends to produce a sunken, flat image, and if it has been long exposed to damp the whole print will be muddy and fogged. It is therefore kept in tins with calcium chloride and backed in the printing frame with a rubber pad. The best results are obtained from a somewhat strong and vigorous negative with fairly hard contrasts.

Great latitude is allowable in the temperature of the bath and this has some effect on the result. Black tones are got by a cool bath and cold grey and often mealy prints if the temperature is too high. However it is only possible to tell by experience all the niceties of result that can be produced by varying the conditions. The best temperature to use for general work is from 80° to 100° Fahrenheit, but sometimes the bath may be used as low as 55° or 60° or as high as 180°. With cold bath paper on the contrary the platinum salt is not upon the paper, but is added to the developer. The paper is sensitized with the iron salt alone and is printed in a similar way to the hot bath paper, it is then floated on a bath composed of phosphate of soda and oxalate of potash with the requisite quantity of platinum salt. The ferrous salt formed by the action of light reduces the platinum salt as before depositing platinum black on the paper.

With this process it is not nearly so necessary to be particular about the absolute absence of moisture as with the hot bath paper, in fact the resulting tones may be considerably modified and often improved by allowing the paper to get more or less damp between printing and developing. It must however be kept dry before printing or mealy prints will result. Neither must the moisture be allowed to act long on the print. The best plan is to leave the prints enclosed in a card-board box in a damp room for a few hours before developing.

To develope the paper, first see that the scum left on the surface of the solution by the last print is well broken up, and then float the paper face down on the liquid for a few seconds, lift it and watch the development, floating it if necessary a second or a third time. The deep shadows give the best indication when development is completed, they are at first reddish and mealy, but as the process goes on they come up to a full velvety black. The proportions of developer given in the paper of instructions sent out by the Platinotype Company are by far the best, but for special puposes they may be considerably modified. For instance an over-exposed print may very often be saved by using a weak developer.

When development is finished with both hot and cold bath papers they must be well washed in two or three changes of very dilute hydrochloric or citric acid to remove the iron salts which would otherwise stain the paper, and then be washed in several changes of pure water for say half an hour. They are then finished and may be blotted off and dried.

In conclusion I would only say that this beautiful process is a very easy one and that with cleanliness and care, the essentials in all photographic work, I think that more pleasing results may be obtained by it than by any other method of printing. The

Platinotype Company send out very full instructions with their paper, and Mr. Willis is always ready and willing to help any one who will apply to him and to shew how any difficulties may be surmounted.

The meeting closed with a vote of thanks to the lecturer proposed by Mr. Moore.

MINUTES OF PRIVATE BUSINESS AND COMMITTEE MEETINGS.

Saturday, February 2nd.

At a P.B.M., S. J. Somerville, H. H. Bond, R. C. Batt, P. G. Stewart, T. A. Headlam, W. J. M. Marsden, M. G. Dashwood, P. M. Sidney, J. C. L. Bott, C. W. Battye, R. L. McClintock, R. B. Graham, G. M. A. Ellis, E. P. Beard, H. G. B. Tomlin, I. V. Paton, R. C. Webb, G. T. V. Litkie, W. R. Smith, J. H. Preston, J. D. Ghica, R. Seymour, Hon. C. W. J. H. Blake were elected Associates.

J. R. de M. Abbott and H. Laing were elected to serve on the Committee for the term.

At a Committee Meeting, G. F. H. Berkeley, F. H. Wolley Dod, L. S. Downes, W. B. Cotton, R. A. Birley were elected Members.

Tuesday, February 26th.

A P.B.M. was held to discuss the formation of a new Section of the Society, and on the motion of the Rev. P. H. Kempthorne it was resolved to constitute one called the Photographic Section.

Several new rules constituting the section and defining its position with regard to the Society were discussed, and notice was given that they would be proposed at the next meeting of the Society. It was agreed that the officers of the section should in the first instance be elected by the Society.

Saturday, March 2nd.

At a P.B.M., the following new rules were passed:—

Rule 33.

That there be a Photographic Section of the Society.

Rule 34.

That the Officers of the Photographic Section consist of a Director and of a Secretary, who shall also be Treasurer of the Section.

Rule 35.

That the Director of the Photographic Section be elected from the Honorary Members.

Rule 36.

That the Photographic Section have the right of electing its own Officers and of making and altering its own Bye-laws, provided that nothing is enacted which conflicts with the rules of the Society.

Rule 37.

That the funds of the Society be chargeable with debts incurred by the Photographic Section to an amount not exceeding in any one year the sum of one shilling per term for each member of the Section.

Also that in Rule 5, after "That the Officers" there be added "of the Society and of the Photographic Section."

The Rev. P. H. Kempthorne was elected Director of the Photographic Section, and P. L. Foster Secretary of the Section.

Saturday, May 18th.

At a P.B.M., J. C. A. G. Mackenzie, L. J. Carter, A. C. Edwards, E. C. Sowerby, J. P, Simeon, L. L. Clery, L. Wood, C. O. B. Blewitt, H. F. Browell, W. R. W. Shand, D. P. A. Gray, B. R. Armstrong, H. A. H. Ramsay, R. A. H. Watson, E. B. Penny, A. B. Johnston, W. P. Lynes, C. A. Ketchen, E. R. M. English, V. H. A. Awdry, Lord William Manners, J. L. Ingham, C. L. C. Thomson, L. C. S. Marshall, H. D. Pack Beresford were elected Associates.

J. R. de M. Abbott and R. C. Gayer were elected to serve on the Committee for the term.

J. E. Hales and Baron G. W. E. E. Zedlitz were elected judges for the Pender Prize.

R. A. Birley resigned the office of Meteorological Album Keeper, and on the motion of the Secretary, seconded by the Treasurer, a vote of thanks to him was passed.

J. P. Simeon was elected Meteorological Album Keeper.

At a Committee Meeting, C. L. Hulbert and P. L. Foster were elected Members.

Wednesday, June 12th.

At a P.B.M., E. C. Ward and O. C. Raphael were elected Associates.

Monday, July 29th.

At a P.B.M., A. J. V. Durell resigned the Office of Secretary, and G. Whitfield that of Treasurer.

Votes of thanks to the retiring Officers were passed.

R. A. Birley was elected Secretary and W. A. Payn, Treasurer.

Monday, September 30th.

At a P.B.M., H. A. C. Colquhoun, J. G. Bartlet, C. Howard Vyse, G. N. Walker, W. L. Weldon, H. R. Phipps, P. H. Cruickshank, H. A. Knight, C. R. Finnis, G. T. J. Bourke, H. S. Wright, R. H. Raphael, A. F. D. Thomas, R. Bright, S. G. G. Craufurd, J. H. Dutton, V. A. W. Van der Byl, U. F. Ruxton, C. C. Hamilton, J. H. Lloyd, Hon. C. Lowry-Corry, W. B. C. Bridge, F. Sanger, G. Graham, G. W. Annesley, R. S. Wilson, L. Gorringe, E. B. Thresher, F. H. A. Sowerby, R. B. C. Scarlett, F. E. S. Hollins, H. E. Walker, A. S. Waley were elected Associates.

R. C. Gayer and F. H. Wolley-Dod were elected to serve on the Committee for the term.

At a Committee Meeting, W. M. Harrison, W. A. Payn, E. W. Denny, R. Oakley, W. Sanger, R. H. Tahourdin, H. F. Blair, J. C. K. Bott, J. P. Simeon were elected Members.

PRIZES.

A prize of the value of £5 is given annually by Lady Pender, in memory of Henry Denison Pender (O.W.), for the best essay on some scientific subject written by a Member or Associate of the Society.

The following are the regulations for competition:

1. That the prize be called "The Pender Prize."

2. That the essays be sent anonymously to the President not later than the second Saturday in the Easter term, with a sealed envelope containing the author's name.

3. That the prize be awarded by a Committee consisting of the President, Vice-Presidents, and two Members or Associates (to be elected by the Committee of the Society at the first meeting in the Easter term), with power to add to their number.

4. That the prize, which will be presented on Speech Day, must consist of scientific books or apparatus chosen by the winner subject to the approval of the President.

The winner may, if he chooses, add to the value of the prize, but such addition must not exceed a small amount, and must receive the sanction of the President.

5. That the essay, which is expected to be the competitors' *bonâ fide* own work, may be on a subject connected with any branch of science recognised by the Society or any other department of science which shall receive the sanction of the President, but competitors must in all cases mention the subject chosen to the President and obtain his sanction before sending in the essay.

6. That preference be given to essays containing accounts of original work of any kind. The authorities consulted (with references) for other statements are in all cases to be given.

In cases of equality between two essays, one on some branch of Physics, and the other on another subject, preference will be given to the former.

7. That competitors be not prohibited from writing a second essay on a subject chosen by them at a previous competition, but should they do so great importance will be attached to the work done and the advance made by them during the interval.

8. That the prize be open only to Members and Associates of the Society who shall have been elected not later than at the first meeting in the previous Lent term, and who are members of the School at the date appointed for the essay to be sent in.

9. That the essay to which the prize is awarded be read by the writer before the Society during the Easter term, on a day to be appointed by the Committee.

10. Essays should be of such a length as not to occupy more than three quarters of an hour in delivery.

The prize for 1889 was awarded to A. C. Deane for an Essay on "The Frog," an abstract of which will be found on pages 80—82.

The President offers a yearly prize, value £1, for the best collection of Lepidoptera made by a Member or Associate during the Easter term. The specimens must be caught or bred by the competitor himself, and as far as possible named by him. The Society offers a second prize, value 10s.

Mr. Bevir also offered a Prize open to the whole Middle School for the best collection of all insects, except dragon-flies, made by any one collector during the Summer term.

There has been a steady improvement during the last four years in the work for these prizes. This year the collections sent in far surpassed those of previous years in setting and classification as well as in the number of specimens shewn up.

The prizes were awarded as follows:

Natural Science Society's Lepidoptera prizes:

J. Warren, First Prize.

R. Oakley, Second Prize.

H. S. Toppin, Extra Prize given by Mr. Penny.

Middle School Insect Prize:

J. D. Ghica
C. L. C. Thomson } Prize.

L. Gorringe, commended for insects.

Mr. Penny again offered a prize, value £1, for the best set of notes made during the Summer term on the occurrence of Animals, Birds, Insects, Flowers, &c., in the neighbourhood of Wellington College. Several very good note books were sent in shewing that great interest had been taken in the work. The prize was awarded to R. W. Holland, accessit J. Warren.

PHENOLOGICAL REPORT.

The following observations have been made of the Plants, Insects, and Birds, contained in the Royal Meteorological Society's list. The chief observers have been Mr. Penny for the plants, Mr. Elton for the insects, and Mr. Davenport for the birds.

PLANTS.

(IN BUD, LEAF, FLOWER; RIPE FRUIT; DIVESTED OF LEAVES; &c.)

1	**Anemone nemorosa** (Wood Anemone)	
2	**Ranunculus ficaria** (Pilewort, or Lesser Celandine)	
3	*Ranunculus acris* (Upright Crowfoot)	May 14
4	**Caltha palustris** (Marsh Marigold)	
5	*Papaver Rhœas* (Red Poppy)	
6	*Nasturtium officinale* (Water Cress)	
7	*Cardamine pratensis* (Cuckoo flower or Lady's Smock)	
8	*Sisymbrium Alliaria* (Garlic Hedge Mustard)	May 16
9	*Draba Verna* (Whitlow Grass)	
10	*Viola odorata* (Sweet Violet)	
11	*Polygala vulgaris* (Milkwort)	May 15
12	*Lychnis Flos-cuculi* (Ragged Robin)	May 30
13	*Stellaria Holostea* (Greater Stitchwort)	
14	**Malva sylvestris** (Common Mallow)	
15	*Hypericum tetrapterum* (Square St. John's Wort)	
16	,, *pulchrum* (Upright St. John's Wort)	
17	**Geranium Robertianum** (Herb Robert)	May 16
18	*Euonymus europæus* (Spindle Tree)	
19	*Acer Pseudo-platanus* (Sycamore)	
20	*Æsculus Hippocastanum* (Horse Chesnut)	
21	*Cytisus Laburnum* (Laburnum)	
22	**Trifolium repens** (Dutch Clover)	
23	*Lotus corniculatus* (Bird's Foot Trefoil)	May 22
24	*Vicia Cracca* (Tufted Vetch)	
25	,, *sepium* (Bush Vetch)	
26	*Lathyrus pratensis* (Meadow Vetchling)	
27	**Prunus spinosa** (Sloe, or Black-thorn)	
28	*Spiræa Ulmaria* (Meadow Sweet)	
29	*Potentilla anserina* (Silver-weed)	June 8
30	*Rosa canina* (Dog Rose)	
31	*Pyrus Aucuparia* (Mountain Ash, or Rowan)	
32	*Cratægus Oxyacantha* Hawthorn)	May 22
33	*Epilobium hirsutum* (Great Hairy Willow-herb)	
34	,, *montanum* (Broad Willow-herb)	June 11
35	*Angelica sylvestris* (Wild Angelica)	
36	*Daucus Carota* (Wild Carrot)	
37	**Hedera Helix** (Ivy)	
38	*Cornus sanguinea* (Dog-Wood)	
39	*Syringa vulgaris* (Lilac)	
40	*Galium Aparine* (Cleavers)	
41	,, *verum* (Yellow Bedstraw)	
42	*Dipsacus sylvestris* (Wild Teasel)	

43	*Scabiosa succisa* (Devil's-bit)	
44	*Petasites vulgaris* (Butter-bur)	
45	**Tussilago Farfara** (Coltsfoot)	
46	**Achillea Millefolium** (Milfoil, or Yarrow)	
47	*Chrysanthemum Leucanthemum* (Ox-eye)	May 25
48	*Artemisia vulgaris* (Mugwort)	
49	*Senecio Jacobæa* (Ragwort)	
50	**Centaurea nigra** (Black Knap-weed)	
51	*Carduus lanceolatus* (Spear Thistle)	
52	,, *arvensis* (Field Thistle)	
53	*Sonchus arvensis* (Corn Sow Thistle)	
54	*Hieracium Pilosella* (Mouse-ear Hawk-weed)	May 31
55	**Campanula rotundifolia** (Hair-bell)	
56	*Ligustrum vulgare* (Privet)	
57	**Convolvulus sepium** (Greater Bind-weed)	
58	*Symphytum officinale* (Comfrey)	May 24
59	*Pedicularis sylvatica* (Red Rattle)	May 15
60	*Veronica Chamædrys* (Germander Speedwell)	
61	*Mentha aquatica* (Water Mint)	
62	*Thymus Serpyllum* (Wild Thyme)	
63	*Prunella vulgaris* (Self-heal)	
64	*Nepeta Glechoma* (Ground Ivy)	
65	*Galeopsis Tetrahit* (Hemp-nettle)	
66	*Stachys sylvatica* (Hedge Woundwort)	
67	*Ajuga reptans* (Bugle)	
68	**Primula veris** (Cowslip)	
69	*Plantago lanceolata* (Ribwort Plantain)	May 15
70	*Mercurialis perennis* (Dog's Mercury)	
71	*Ulmus montana* (Wych Elm)	
72	*Salix Caprea* (Great Sallow)	
73	*Fagus sylvatica* (Beech)	
74	*Corylus Avellana* (Hazel)	
75	*Orchis maculata* (Spotted Orchis)	
76	*Iris Pseud-acorus* (Yellow Iris)	
77	*Narcissus Pseudo-narcissus* (Daffodil)	
78	*Galanthus nivalis* (Snowdrop)	
79	**Scilla nutans** (Blue-bell)	

INSECTS.

(FIRST APPEARANCE; NOTICES OF UNUSUAL ABUNDANCE OR SCARCITY).

80	*Melolontha vulgaris* (Cock Chafer, or May Bug)	May 16
81	*Rhizotrogus solstitialis* (Fern Chafer, or July Chafer)	
82	*Timarcha lævigata* (Bloody-nose Beetle)	May 18
83	*Lampyris noctiluca* (Glow-worm)	by June 25
84	*Apis mellifica* (Honey Bee, or Common Hive Bee)	
85	*Vespa vulgaris* (Wasp)	Mar. 8
86	*Pieris Brassicæ* (Large Garden White or Cabbage Butterfly)	by June 1
87	,, *Rapæ* (Small Garden White or Cabbage Butterfly)	May 16
88	*Anthocharis Cardamines* (Orange-tip Butterfly)	May 21
89	*Epinephile Janira* (Meadow-brown Butterfly)	June 25
90	*Bibio Marci* (St. Mark's Fly)	

BIRDS.

(ARRIVAL ; SONG ; NESTING ; FIRST EGG.)

91	*Strix aluco* (Brown Owl)	
92	*Muscicapa grisola* (Flycatcher)	arr. May 16.
93	*Turdus musicus* (Song Thrush)	
94	,, *pilaris* (Fieldfare)	
95	*Daulias luscinia* (Nightingale)	sg. April 25
96	*Saxicola œnanthe* (Wheatear)	
97	*Phylloscopus trochilus* (Willow Wren)	
98	,, *collybita* (Chiff chaff)	
99	*Alauda arvensis* (Skylark)	sg. Feb. 19
100	*Fringilla cœlebs* (Chaffinch)	sg. Feb. 1
101	*Corvus frugilegus* (Rook)	
102	*Cuculus canorus* (Cuckoo)	arr. & sg. April 25
103	*Hirundo rustica* (Swallow, or Chimney Swallow)	arr. April 22, last seen Oct. 14
104	,, *urbica* (House Martin)	
105	,, *riparia* (Sand-Martin)	
106	*Cypselus apus* (Swift)	arr. May 15
107	*Caprimulgus europœus* (Goatsucker, or Fernowl)	sg. May 24
108	*Columba turtur* (Turtle Dove)	arr. May 19
109	*Perdix cinerea* (Partridge)	
110	*Scolopax rusticola* (Woodcock)	
111	*Crex pratensis* (Corncrake, or Land Rail)	

MISCELLANEOUS.

(FIRST APPEARANCE.)

112 Frog Spawn

METEOROLOGICAL REPORT.

JANUARY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·10	33·4	19·6	60·1	23·8	23·8	100	10		N.E.
2	·35	31.8	21.9	72·3	28·7	28·5	95	10		N.E.
3	·63	31·9	27·6	70·6	31·2	31·0	96	5		N.E.
4	·62	31·9	23·6	36·1	29·8	29·6	96	10		N.
5	.37	26·1	22·6	36·0	24·1	24·1	100	10		N.E.
6	30·05	28·7	14·8	32·5	21·2	21·1	97	10		N.W.
7	29·97	39·0	20·5	52·5	27·5	27·2	93	9		S.W.
8	·83	45·9	26·8	47·8	38·1	38·0	99	8		S.
9	.48	47·5	37·4	83·0	45·8	44·1	88	7	·66	S.
10	·38	41·2	36·3	46·4	38·5	37·5	91	10	·04	N.
11	·62	39·3	28·2	66·7	32·0	31·7	96	7		N.E.
12	·38	34·1	27·8	37·0	32·0	31·3	90	10	·15	N.E.
13	29·90	37·1	30·3	40·9	34·4	34·2	98	10	·01	N.
14	30·15	37·6	33·6	42·5	36·8	36·2	95	10		N.
15	30·12	36·9	33·5	37·4	34·7	33·8	90	10		E.
16	29·86	36·8	31·7	38·4	32·8	32·1	92	10	·02	S.E.
17	30·21	41·2	32·0	51·6	35·6	35·4	98	10	·01	S.
18	·39	48·5	30·0	88·4	41·5	41·3	98	2		S.
19	·34	48·5	32·2	90·3	35·5	35·0	95	0		S.W.
20	·20	44·8	34·8	49·8	39·2	39·1	99	10	·02	S.W.
21	·24	40·8	26·1	48·5	32·0	31·6	94	10	·02	S.E.
22	·37	39·9	31·3	73·1	37·2	35·7	87	9		N.
23	·44	39·9	28·2	47·9	32·4	32·0	94	10		N.E.
24	·43	43·7	30·1	49·1	39·9	39·7	98	10		N.E.
25	·45	43·9	39·2	46·8	39·9	38·9	92	10		N.
26	30·39		38·2		34·9	41·7	84	10		S.E.
27		48·1		84·1						
28			28·0						·11	
29										
30	30·02	46·3		73·1	37·4	36·8	95	7	trace	S.W.
31	30·03	52·3	36·6	95·9	45·4	44·9	97	10	0·7	S.W.
Mean	30·12	39·9	29·4	57·1	34·7	34·2	95	8·7	Total 1.11	

FEBRUARY.

Date	Barom. Reduced.	Thermomometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	29·84	54·7	44·7	65·1	50·2	49·5	95	5		S.
2	·74	43·4	35·8	87·2	36·4	33·1	72	10		S.W.
3	·81	51·6	30·8		33·0	31·8	85	10	·38	W.
4	29·78	38·7	31·4		35·4	32·9	78	0		N.W.
5	30·32	50·2	23·5	67·3	29.3	29·0	94	10		S.W.
6	30·03	52·8	27·4	58·9	40·8	38·9	85	10	·34	W.
7	29·50	40·6	39·6	52·1	43·4	42·9	96	10	·21	S.W.
8	·52	49·3	34·4	74·1	39·9	38·2	87	10		N.E.
9	·62	34·9	28·9	79·6	30·4	30·2	96	3		N.
10	·82	38·4	20·0	51·3	25·9	25·1	80	2	·30*	W.
11	29·81	36·4	27·4	81·9	31·2	30·5	89	10		N.
12	30·14	35·0	18·3	90·4	23·0	22·1	75	8		N.
13	30·12	49·0	17·7	50·3	21·1	20·4	78	3	·27	N.W.
14	29·51	48·9	26·0	67·4	48·9	48·2	95	9		W.
15	29·98	47·7	27·4	90·6	32·0	31·1	88	5		S.W.
16	30·25	45·2	28·7	48·8	31·4	30·0	81	10	·37	S.
17	·24	56·4	31·1	100·7	43·4	42·7	95	8	trace	W.
18	·41	53·5	41·7	101·4	44·8	44·1	95	0		W.
19	·40	49·2	43·7	79·2	46·1	45·6	96	10		W.
20	·25	54·6	26·2	91·6	31·1	28·8	70	10	·12	N.
21	·01	50·6	29·7	100·2	34·4	33·0	85	8	trace	N.E.
22	·22	40·4	29·9	91·1	35·2	34·0	88	5		N.W.
23	·27	51·4	27·5	85·5	32·5	30·8	80	4		N.
24	30·11	54·6	25·6	64·6	28·9	28·1	87	10	trace	N.E.
25	29·85	47·9	28·7	54·2	30·4	29·0	78	10	·31	E.
26	·48	49·4	37·0	80·0	39·2	38·7	96	3		S.E.
27	29·64		37·6		39·9	39·6	98	7		S.W.
28	Not	taken								
Mean	29·95	47·1	30·4	75·6	35·5	34·4	87	7·0	Total 2·30	

*Melted snow, not measured accurately.

MARCH.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1		48·3		54·3	Not	taken			·27	
2	29·73	37·5	30·5	86·5	35·3	34·9	96	5		S.E.
3	30·03	35·6	21·0	92·1	28·4	27·6	84	2		S.W.
4	·06	36·6	29·6	54·2	31·2	30·8	94	2		S.W.
5	30·16	39·1	25·9	91·6	29·9	29·6	95	10		S.
6	29·82	45·9	24·7	95·2	35·4	34·9	96	0	·36	S.W.
7	·40	76·1	32·0	74·1	40·5	40·4	99	10	·50	W.
8	·29	50·8	39·0	107·5	47·9	47·9	100	10		S.W.
9	·71	52·9	29·1	67·4	32·7	31·8	88	10	·25	S.
10	·61	43·2	27·9	71·3	35·3	35·3	100	7		S.W.
11	·96	46·1	30·8	102·7	37·4	36·3	90	1		W.
12	29·90	53·5	26·7	89·0	35·4	34·1	88	10	·01	W.
13	30·20	50·9	34·4	92·4	43·9	41·2	80	7		N.W.
14	·13	59·2	30·5	115·8	36·6	36·2	96	5	·01	W.
15	30·09	56·3	31·3	100·2	33·3	32·8	94	7		S.W.
16	29·48	52·4	25·6	104·1	35·4	33·0	79	10		W.
17	·28	51·2	34·9	79·6	44·2	43·0	91	10		W.
18	·90	53·3	38·8	82·3	45·2	43·6	89	10	trace	S.
19	29·39	51·5	36·3	73·5	43·6	42·2	89	9		S.E.
20	28·98	49·9	35·6	106 4	43·3	41·1	84	5	·19	E.
21	29·30	55·1	35·0	110·6	35·5	35 3	98	10	·08	N.
22	29·77	44·4	32·8	133·1	37·3	36·6	94	10		N.W.
23	30·30	51·4	28·9	105·4	38·9	37·4	87	2	·02	N.
24	·26	58·0	33·5	98·8	42·8	42·2	95	10		W.
25	30·07	57·9	31·6	103·2	37·2	36·3	92	7	·11	N.E.
26	29·96	54·6	39·6	110·9	42·1	40·9	90	10		E.
27	·81	62·1	32·4	117·8	41·2	40·2	92	10	·06	S.E.
28	·69	59·6	27·6	104·7	40·5	40·0	96	7		W.
29	29·90	59·9	30·6	100·6	44·4	44·4	100	5		S.W.
30	30·18	54·6	25·3	101·4	49·9	48·0	86	10	·12	W.
31	29·92	50·3	36·4	99·6	45·6	42·6	79	10	·07	W.
Mean	29·81	51·6	31·3	94·4	39·0	38·0	91	7·4	Total 2·05	

APRIL.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative. Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·01	55·5	29·6	84·5	42·9	42·1	94	3	trace	W.
2	29·69	59·2	36·5	104·4	47·7	47·5	99	10	·11	S.W.
3	·68	60·3	32·6	101·7	44·5	41·8	80	10	·24	W.
4	·25	50·2	32·9	106·6	46·5	42·9	75	2	·03	S.W.
5	·46	53·7	38·7	105·1	45·4	43·9	90	4	trace	S.E.
6	·52	62·1	34·5	97·9	41·2	40·8	97	10	·30	N.E.
7	·38	53·3	35·9	100·3	40·1			10	trace	N.E.
8	·35	55·5	38·5	94·3	45·9	44·7	92	10	trace	E.
9	·34	48·4	42·1	58·5	43·1	43·1	100	10	·36	E.
10	·51	44·0	39·7	55·3	40·2	40·2	100	10	·10	N.E.
11	·56	47·1	36·0	73·5	40·7	40·7	100	10		E.
12	·61	43·4	32·3	68·8	43·4	43·2	98	10	trace	E.
13	·72	53·6	33·7	101·1	40·5	40·2	98	10	·18	E.
14	·74	43·4	34·6	72·0	43·4	42·4	92	10	·03	N.
15	·96	49·0	35·4	104·7	39·8	37·5	82	10		N.
16	·94	50·0	28·4	100·4	41·8	39·2	80	8		N.
17	29·93	55·3	33·5	105·4	44·7	43·6	92	10		N.
18	30·10	68·9	44·2	114·0	51·9	50·5	90	10		N.E.
19	·23	61·6	41·3	112·4	52·9	49·4	77	3		S.W.
20	30·04	69·9	44·2	110·5	51·8	49·6	85	10		S.W.
21	29·82	69·0	44·1	109·6	49·2	48·2	93	10	·04	S.
22	·80	56·4	36·8	112·2	52·1	48·2	75	5	·05	S.E.
23	·79	51·2	34·5	97·3	48·0	44·2	74	6	·27	S.W.
24	·95	49·7	38·7	95·1	46·0	43·3	81	9	·26	S.
25	·73	53·9	39·6	103·5	44·9	44·5	97	10		N.
26	·99		32·4	105·9	53·8	48·8	69	2	·11	S.E.
27	·98	59·9	44·2	116·5	52·9	50·0	81	5		S.W.
28	·77	56·5	40·8	109·7	49·1	48·3	94	10	·10	S.E.
29	·84	57·0	40·7	118·3	47·4	45·3	86	6	·06	S.E.
30	29·56	60·8	42·4	112·5	50·9	50·3	96	10	·09	S.E.
Mean	29·74	55·1	37·3	98·4	46·1	44·6	89	8·1	Total 2·33	

MAY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·67	55·7	42·4	112·8	52·2	49·0	79	6	·04	S.
2	·69		39·4	97·2	51·2	49·2	86	8	·06	S.
3	·95	63·9	42·2	113·8	54·9	52·4	83	9		S.
4	·93	75·1	44·3	127·3	63·9	57·9	67	6		S.
5	·86	78·0	48·4	134·3	65·4	61·1	77	8	trace	S.
6	·82	73·9	47·1	114·3	57·9	56·1	88	6		N.E.
7	·82	60·7	49·5	101·7	57·7	57·2	97	10	·01	S.E.
8	·85	67·5	45·7	113·3	53·9	51·4	83	9	trace	S.E.
9	·72	73·1	43·2	118·3	67·5	62·5	73	8	·18	S.
10	·75	58·4	48·2	69·1	51·8	51·8	100	10	trace	S.E.
11	·79	56·1	44·2	97·8	53·1	51·5	89	10	·18	N.E.
12	·81	56·9	45·3	61·1	47·7	47·7	100	10	·07	N.E.
13	·87	55·8	47·0	78·2	50·7	50·7	100	10	·02	N.W.
14	·85	60·1	48·4	110·8	51·0	50·9	99	10		E.
15	·80	63·9	45·6	106·9	52·1	50·6	90	10		N.W.
16	·96	70·4	46·2	112·9	60·1	54·6	69	2		N.W.
17	·83	70·1	44·5	118·1	53·2	52·1	93	10	·20	S.E.
18	29·83	} 59·3	48·1	} 110·5	55·1	51·1	75	8	} ·40	E.
19			} 51·5							
20	30·06	66·3		123·1	55·8	54·9	94	8		N.W.
21	·11	68·9	46·0	123·0	59·6	58·0	90	2		N.W.
22	30·05	75·0	44·7	124·9	67·6	58·8	65	2		N.W.
23	29·90	82·0	51·6	131·8	67·3	63·4	79	1		N.W.
24	·68	77·9	50·8	132·0	68·7	61·3	62	6		S.E.
25	·58	65·6	57·0	111·9	59·7	58·9	95	10	·25	S.E.
26	·67	55·2	50·3	59·3	54·6	52·7	87	10	1·59	N.W.
27	·74	59·1	50·0	99·9	51·6	51·6	100	10	·11	N.E.
28	·70	60·8	49·5	109·8	55·5	52·7	82	7	·23	S.W.
29	·72	59·6	48·2	111·8	52·2	50·1	86	6	·15	S.W.
30	·89	77·5	45·3	119·0	52·9	50·2	82	8	·04	S.W.
31	29·86	68·2	46·6	119·1	55·2	52·4	82	10		S.E.
Mean	29·83	66·0	47·0	108·8	56·7	54·1	85	7·7	Total 3·53	

JUNE.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative. Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	%	0—10	In.	
1	30·00	73·6	43·4	124·8	59·9	56·1	77	4		S.
2	29·70	77·7	54·4	121·7	73·9	69·7	78	4	·17	S.E.
3	29·88	70·9	54·6	131·7	62·2	59·0	81	8		S.
4	30·31	73·0	49·8	122·1	69·7	59·9	54	6		S.W.
5	·44	71·1	47·4	122·2	65·1	56·1	56	0		N.E.
6	·15	79·3	57·9	119·3	67·7	60·4	63	6	·07	N.E.
7	30·03	79·1	57·9	132·1	64·4	61·8	84	8	·24	N.E.
8	29·98	60·3	52·4	84·2	56·9	55·1	88	10	trace	N.E.
9	·71	63·0	53·7	63·0	58·9	55·2	78	10	·16	N.E.
10	·71	53·4	48·1	79·1	59·6	47·8	89	10	·26	N.E.
11	29·91	62·2	47·1	99·4	52·8	52·6	99	10	·01	N.E.
12	30·03	63·8	47·3	100·2	61·7	57·2	75	10		N.E.
13	29·99	70·1	51·2	125·4	61·3	55·2	67	10		N.E.
14	30·03	61·9	50·1	99·5	53·7	51·6	86	10		N.E.
15	·00	65·9	53·0	120·4	57·9	55·8	87	10		W.
16	·11	70·6	53·0	123·2	65·0	57·1	60	3		N.
17	·22	69·8	45·2	123·9	63·7	56·0	61	3		W.
18	·30	64·4	47·4	120·2	57·0	53·2	76	10		S.E.
19	·13	68·0	46·2	119·3	57·9	53·1	72	7		N.E.
20	·10	72·9	48·5	117·7	67·7	59·0	58	8		N.E.
21	·09	71·5	52·1	127·5	59·9	55·8	76	6		N.E.
22	·13	75·4	50·8	124·1	54·6	53·3	91	10		N.E.
23	·11	68·4	49·5	92·6	56·4	52·3	75	10		N.E.
24	·07	65·9	45·1	119·5	58·2	55·6	83	10		N.
25	·10	72·5	54·2	128·5	67·4	58·6	57	10		N.E.
26	·14	75·2	53·2	130·4	67·7	58·7	56	2		N.E.
27	·20	78·8	54·1	132·2				0		N.E.
28	·09	78·5	63·7	126·1	68·0	61·1	65	2		N.E.
29	·23	74·4	51·1	125·4	64·8	60·9	78	0		N.E.
30	30·34	74·7	50.8	128·3	66·7	53·2	81	6		N.E.
Mean	30·07	70·9	51·1	116·1	62·1	56·6	74	6·8	Total ·91	

JULY.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·42	72.8	50·6	130·1	62·9	56·6	66	5		W.
2	·37	70·9	48·9	131·9	59·1	54·2	72	7		N.W.
3	·32	64·3	47·1	113.3	55·3	51·8	78	10		N.W.
4	·18	70·0	53·9	116.6	63·2	58·8	75	9		N.W.
5	·22	75·9	53·2	123·4	64·9	64·8	99	2		N.W.
6	30·14	78·8	46·3	126·9	67·8	67·6	99	0		N.W.
7	29·79	70·0	54·8	111·9	64·3	64·0	98	10		S.E.
8	·76	68·4	52·3	102·7	55·8	53·8	87	10	·11	S.W.
9	·88	69·4	54·4	77·6	63·7	61·7	88	6	.02	S.E.
10	29·71	65·0	57·1	100·8	61·1	60·1	94	10	·43	S.W.
11	30·01	70·9	53·4	124·2	63·4	60·5	83	10	·06	S.E.
12	30·01	72·5	49·9	124·7				10	·04	S.E.
13	29·61	62·9	55·9	104·2	59·1	58·3	95	10		S.W.
14	29·97	67·4	55·2	120·7	62·2	57·7	75	10	·05	S.W.
15	30·00	65·7	52·8	126·8	59·9	55·5	75	10	.05	S.W.
16	29·91	65·3	48·6	118·2	55·9	53·2	83	10	·06	S.W.
17	·83	65·7	49·8	126·4	57·8	55·5	86	10	·01	S.W.
18	·99	67·2	47·4	134·7	58·9	53·2	68	8		N.W.
19	·97	68·8	45·0	124·8	60.0	53·3	63	3	·01	N.W.
20	·82	65·0	50·0	106·0	60·4	53·7	63	10	·08	S.W.
21	·66	68·2	54·9	112·4				10	·02	S.W.
22	·83	65·3	51·1	118·7	60·6	58·8	89	10	·55	S.W.
23	·86	62·3	47·5	120·0				10	·40	S.W.
24	·63	61·4	46·8	118·5	57·4	55·4	87	10	·08	S.W.
25	·71	61·9	52·6	112·4	58·8	53·1	68	9	trace	S.W.
26	·75	65·0	51·5	119·1	59·7	54·6	71	10	·10	S.W.
27	29.89	68.5	50·6	103·9	56·5	53·8	83	10	trace	S.W.
28	30·01	71·9	49·4	88·5	58·8	56·3	84	8	trace	S.W.
29	·13	74·9	48·2	131·7	61·2	58·7	85	9		W.
30	·17	78·9	52·6	133·1	67·4	64·3	83	3		W.
31	30·15	77·1	53·6	127·3	70·7	63·9	66	2		S.E.
Mean	29·96	68·8	51·1	117·1	61·0	57·6	81	8·1	Total 2·07	

AUGUST.

Date	Barom. Reduced.	Thermometers.					Relative Humidity.	Amnt. of Cloud.	Rain.	Wind.
		Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.				
	In.	°	°	°	°	°	%	0—10	In.	
1	30·00	81·9	53·8	135·0	71·4	64·9	68	5		S.E.
2	30·01	76·1	54·5	130·8	66·0	59·4	66	6	·12	N.W.
3	29·90	66·6	58·0	120·3	60·9	60·6	98	10	·11	S.
4	30·02	70·3	53·4	131·3	64·8	59·2	69	5	·07	N.E.
5	29·75	68·9	56·2	124·1	59·9	59·1	95	10	·08	S.W.
6	29·76	71·7	50·7	122·3	59·7	55·1	73	4	·02	S.W.
7	30·00	69·1	51·0	116·7	61·9	56·3	69	2		S.W.
8	30·13	70·4	45·3	128·4	60·9	56·8	76	4		S.W.
9	29·97	70·7	49·7	95·1	59·3	57·5	89	10	·32	S.W.
10	·80	66·2	50·0	123·3	59·3	56·3	82	10	·07	N.W.
11	·55	64·6	48·5	110·2	57·9	55·3	83	7	·04	N.E.
12	29·74	60·4	47·7	111·5	54·9	53·2	88	10		N.
13	30·01	64·7	51·0	114·0	59·5	54·5	71	7		W.
14	30·00	64·3	49·7	117·8	61·4	56·5	73	9	·09	S.W.
15	29·86	70·3	54·8	114·8	64·4	59·2	71	5	·08	W.
16	30·02	74·2	55·2	127·3	64·7	59·7	72	6	trace	S.E.
17	29·83	70·2	58·6	123·1	61·7	60·1	90	10		S.W.
18	30·02	67·9	48·1		62·5	55·8	64	6		W.
19	29·80	70·9	49·5	115·5	62·3	57·7	74	10	·11	S.
20	·85	63·9	55·7	111·3	58·3	49·9	55	10		W.
21	·55	63·6	52·6	107·9	58·2	56·0	86	10	·21	S.
22	·53	64·8	53·0	120·3	57·0	54·0	81	8	·03	S.W.
23	·98	60·8	48·9	109·3	57·0	51·3	67	9	·06	N.W.
24	·86	63·1	50·9	115·3	55·0	54·0	93	8	·29	W.
25	29·88	64·7	40·7	123·6	56·8	50·9	66	4	·09	N.W.
26	30·06	61·6	47·2	109·2	56·0	51·2	71	8		W.
27	·26	66·6	42·3	128·4	59·5	55·0	74	5		N.W.
28	·23	68·7	48·1	123·2	58·7	54·2	74	8		W.
29	·21	75·4	47·6	123·6	61·8	57·7	77	0		W.
30	·16	81·7	44·0	127·7	70·2	63·2	65	0		S.
31	30·18	77·5	48·2	124·3	68·1	63·1	73	0		S.W.
Mean	29.92	68·8	50·5	119·5	61·0	56·7	76	6·6	Total 1·79	

SEPTEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	30·21	70·9	55·0	111·1	57·7	57·0	95	0		N.
2	29·47	70·8	55·1	118·4	62·7	61·0	90	10	·03	S.E.
3	30·03	71·4	58·8	125·3	62·1	61·0	94	10	·01	N.
4	·16	67·7	57·6	114·2	59·9	59·1	95	6		N.W.
5	·25	63·1	54·5	90·4	58·7	57·9	94	10		N.E.
6	·29	67·7	52·5	108·1	58·6	56·8	88	8		E.
7	·18	62·1	48·1	112·8	59·7	57·6	88	8	·02	N.W.
8	·10	59·6	43·2	116·9	52·5	50·2	85	6	trace	N.W.
9	·15	68·9	53·3	109·1	59·1	57·7	92	10		S.
10	·24	77·0	53·6	122.8	60·8	58·3	85	10		N.E.
11	·21	79·5	52·1	128·2	71·9	64·5	63	4		N.E.
12	·22	76·7	58·0	127·2	69·7	64·4	72	8		W.
13	·25	77·3	50·1	127·2	63·4	62·7	96	10		S.E.
14	·35	63·7	54·8	115·3	58·3	54·8	79	5		N.E.
15	·39	70·3	44·5	111·8	52·7	49·5	79	9		N.E.
16	·42	62·8	39·0	115·3	56·0	50·6	68	6		N.E.
17	·24	61·6	30·4	111·6	56·1	50·2	66	5		S.W.
18	30·21	65·0	34·1	114·5	58·2	51·7	64	3		N.E.
19	29·91	60·3	40·2	114·4	58·3	53·4	72	10	·13	S.
20	·68	58·4	45·1	112·1	52·7	48·7	74	8	·04	W.
21	·70	55·3	39·8	107·5	49·1	44·8	73	9	·04	N.E.
22	·70	55·6	39·2	94.3	52·7	48·5	73	9	trace	N.W.
23	·96	57·8	32·4	104·6	46·1	43·3	80	6	·21	N.W.
24	·57	59·4	46·4	79·6	55·5	55·4	99	10	·76	S.W.
25	29·84	54·6	40·0	100·9	43.6	41·5	85	4	trace	N.W.
26	30·24	58·9	33.8	99·2	50·3	47·2	80	8		N.W.
27	30·19	67·9	50·1	99·7	56·3	54·8	90	10		W.
28	29·90	59·5	52·2	110·5	54·0	50·0	74	9	trace	N.W.
29	·87	53·1	43·0	85·8	50·2	45·9	73	9	·04	N.W.
30	29·71	56·2	44·8	106·3	48·1	48·1	100	10	·03	N.W.
Mean	30·55	64·4	46·7	109·8	56·5	53·6	82	7·7	Total 1·31	

OCTOBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/°	0—10	In.	
1	29·94	57·0	45·4	109·3	52·9	49·4	77	10	·02	N.
2	·95	56·6	42·0	102·5	52·0	49·8	85	9	·01	N.
3	·84	57·5	43·3	104·8	48·7	48·3	97	9	·64	N.
4	·57	57·0	40·5	101·9	47·4	45·8	89	6	·06	N.W.
5	·68	63·2	40·4	103·8	54.9	51·7	79	10	·20	W.
6	·92	56·7	45·8	90·6	51·9	49·2	82	6	·15	S.W.
7	·38	57·3	51·7	97·7	52·9	50·1	81	10	·12	W.
8	·32	57.1	53·4	104·7	53·5	49·8	76	10	·10	W.
9	·27	56·5	41·4	97·5	54·1	49·6	72	4	·03	S.W.
10	·43	55·1	40·5	87·7	44·8	44·6	98	10	·16	S.W.
11	·51	59·0	39·9	102·4	53·6	47·5	64	10	·04	S.W.
12	·67	57·0	37·7	113·7	46·9	45·5	90	10	·03	S.W.
13	29·87	55·0	32·1	98·0	53·4	49·2	73	5		S.W.
14	30·00	57·1	30·6	100·7	39·9	38·8	91	0	·02	S.W.
15	29·89	60·2	31·8	107·0	47·4	47·0	97	10	·30	S.W.
16	·76	57·1	39·4	103·7				10	·02	S.W.
17	·74	59·8	40·4	111·3	52·0	49·3	82	10	·16	S.W.
18	·69	55·2	41·4	83·8	48·0	48·0	100	10	·18	S.W.
19	·62	51·2	46·9	79·7	49·6	49·6	100	10	·94	S.E.
20	·22	55·9	43·6	126·5	47·0	47·0	100	10	·01	S.E.
21	·36	57·0	43·7	100·6	48·4	47·9	97	10	·02	S.E.
22	·50	55·4	42·3	96·7	49·5	48·7	94	10	·10	S.E.
23	·65	59·5	37·6	103·6	46·1	46·1	100	10	·03	S.E.
24	29·88	49·4	33·8	66·9	49·2	49·2	100	10	·01	S.E.
25	30·25	49·8	33·4	79·7	41·7	41·7	100	10	·06	S.E.
26	30·01	50·0	34·2	82·9	43·1	43·0	99	10	·04	N.E.
27	29·90	52·1	36·0		44·4	44·1	98	10	·01	N.E.
28	·79	53·6	37·9	90·0	48·8	48·8	100	10	·01	N.E.
29	·79	54·1	38·6	75·9	48·2	48·2	100	10	·02	N.E.
30	·99	56·3	41·7	84·1	47·5	47·3	99	2	·03	W.
31	29·72	58·1	37·9	90·1	49·4	49·2	99	10	·12	S.W.
Mean	29·71	56·0	40·2	96·6	48·9	47·5	91	8.7	Total 3·64	

NOVEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In.	°	°	°	°	°	°/o	0—10	In.	
1	29·98	57·0	40·1	104·2	48·5	47·9	96	10	·21	S.W.
2	29·95	55·3	38·2	97·6	49·1	45·4	76	4	·01	S.W.
3	30·00	52·0	41·5	90·4	47·8	47·8	100	10	·30	W.
4	29·96	53·4	38·5	75·3	50·9	49·2	88	10	trace	W.
5	29 98	49·5	29·8	92·4	35·1	34·9	98	6		S.W.
6	30·39	53·4	34·8	60·3	41·9	11·9	100	10	·01	S.W.
7	·55	54·6	37·5	76·0	51·9	51·9	100	10		S.W.
8	·50	56·0	31·9	79·5	51·0	50·3	95	10		S.W.
9	·44	57·0	42·7	81·7	50·3	50·3	100	10		S.W.
10	·46	55·4	43·8	73 0	49·2	49·2	100	10		S.W.
11	·47	56·5	47·8	77·4	50·2	49·7	97	10		S.W.
12	·48	53·6	32·0	81·8	40·1	40·1	100	10		S.W.
13	·37	52·8	29·2	82·9	29·2	29·2	100	10		S.W.
14	·36	56·2	38·9	90·3	44·5	44·5	100	10		N.E.
15	·43	59·7		93·2	50·3	50·0	98	10		S.W.
16	·55	57·4	42·8	80·7	52·6	51·7	94	10	.01	S.W.
17	·59	53·8	37·8	92·8	47·2	47·2	100	10		S.W.
18	·55	58·9	43·4	84·1	50·1	49·9	99	10	·01	S.E.
19	·63	59·5	45·6	76.9	49·5			10	·02	S.E.
20	·79	55·0	40·0	79·7	48·6			10	·01	S.E.
21	·49	58·5	37·8	82·3	40·1			10		S.E.
22	·39	59·0	43·4	91·8	43.9			10	·02	S.E.
23	·16	54·1	39·7	69·6	46·2			10	·04	S.E.
24	30·02	59·5	35·3	72·2	49·5			10	·01	S.E.
25	29·89	57·4	42·7	67·8	49·2	49·2	100	10	·12	S.E.
26	·98	55·4	37·8	92·5	47·6	47·6	100	10	·01	S.E.
27	29·70	45·2	32·3	85·3	38·4	38·1	97	10	trace	N.W.
28	30·00	42·0	26·9	70·7	30·2	29·5	88	10		N.W.
29	·29	48·6	25·9	73·2	30·0	28·8	80	10		N.W.
30	30·28	47·6	29·4	78·7	32·3	31·5	89	10		N.W.
Mean	30·29	54·5	37·5	81·8	44·8	44·0	96	9·7	Total ·78	

DECEMBER.

Date	Barom. Reduced.	Thermometers. Max.	Min.	Solar Max.	Dry Bulb.	Wet Bulb.	Relative Humidity.	Cloud.	Rain.	Wind.
	In	°	°	°	°	°	°/o	0—10	In	
1	30·34	39·4	28·9	74·6	30·3	29·7	90	4		N.
2	·53	34·0	23·2	61·4	29·6	29·2	93	1		N.E.
3	·49	36·3	18·9	68·8	25·2	25·2	100	3		N.E.
4	·55	39·4	22·8	67·0	30·0	29·6	93	10		E.
5	·59	43·5	29·9	48·3	31·2	31·0	97	10	·54*	N.E.
6	·43		31·1	42·0	33·0	32·8	97	10		N.E.
7	·02	35·4	30·6	35·5	33·0	32·9	99	10		S.
8	30·34	45·9	29·9	73·9	30·0	29·9	98	4	·14	N.W.
9	29·93	49·0	29·9	58·5	45·9	45·9	100	10	·05	W.
10	·43	47·2	44·4	54·2	45·8	44·7	92	10	·02	E.
11	29·43	40·1	28·7	52·0	34·9	34·3	95	5		N.
12	30·01	44·7	22·3	79·2	32·4	31·2	84	5	·08	S W.
13	29·78	47·3	32·5	60·9	44·0	43·9	99	10		S.
14	30·05	35·2	26·6	41·2	32·8	32·8	100	10	·01	N.E.
15	·37	45·1	30·8	50·1	35·1	35 1	100	10	·02	W.
16	·42	50·2	35·1	54·2	45·9	45·7	99	10	·01	N.
17	·45	52·9	45·5	59·2	50·2	50·2	100	10	trace	N.E.
18	·25	50·7	47·2	62·2	49·4	48·5	94	10	·01	S.W.
19	30·31	44·9	30·3	81·4	35·7	35·5	98	10	·03	S.E.
20	29·67	45·4	35·4	49·0	43·9	43·4	96	10	·09	S.
21	·78	50·9	33·4	57·5	40·8	39·9	93	10	·27	S.
22	·59	51·9	40·2	67·1	50·3	49·8	97	8	·24	S.W.
23	·97	50·9	38·3	85·2	43·4	42·5	93	4	·14	S.E.
24	29·68	57·9	43·2	62·3	50·7	50·7	100	10	·05	S.W.
25	30·47	46·7	31·1	79·7	37·9	37·4	96	4	trace	S.W.
26	·54	40·9	29·4	46·0	33·4	33·4	100	10		S.E.
27	·45	39·1	33·4	42·6	37·3	36·6	94	9		E.
28	·21	31·1	30·2	35·3	30·9	29·3	97	10		E.
29	·22	32·9	19·0	48·2	21·7	21·7	100	8	trace	N.E.
30	·34	34·3	20·9	40·8	32·7	32·4	96	10	trace	N.
31	30·28	36·9	26·6	55·6	27·4	27·1	93	10	Total	S.E.
Mean	30·16	43·3	31·3	57·9	36·9	36·5	96	8·2	1·70	

Total rainfall for the year 23·52 in. *Snow

J. P. SIMEON,

METEOROLOGICAL ALBUM KEEPER.

ENTOMOLOGICAL REPORT.

Lepidoptera cannot be said to have been abundant during the past season, the rainy weather of 1888 having killed the larvæ and pupæ in great numbers. Still, though imagines were scarce, larvæ were plentiful, and we may hope for a successful season next year. Sugaring proved useless, as, of the Heterocera, the Noctuae were especially scarce, and very few captures were made of the Bee Hawks of which many were taken last year. In spite of this, however, several good captures have been made and past records improved upon, the most noticeable being a fine specimen of Dominula taken by J. Warren, besides Cytherea, Augur, Brunnea, Proteus, Oleracea, Filogrammaria, and Comitata, all of which were new to our list. Among the Diurni of course we could hardly hope for a fresh capture, but Argiolus, of which Mr. Awdry obtained a specimen, has not, to our knowledge, been taken since 1878. Amongst the good captures we may mention Porcellus, several Tiliae and Bajalaria, though this last was in very poor condition. The collections shown up this year were far above the average, Warren's being a really good collection, considering the short time in which it had been made. In conclusion, we have to thank Messrs. Bevir and Elton for the kind assistance they have given to Entomologists throughout the School.

The following dates of capture for 1889 are earlier than any previously recorded in our lists.

Rhapalocera.

Argynnis Adippe	June 29	Lycæna Argiolus	May 25
Hipparchia Janira	June 20		

Heterocera.

Smerinthus Tiliae	June 3	Xanthia Silago	Sept. 25
Calligenia Miniata	June	Agriopis Aprilina	Sept. 28
Nemeophila Russula	June 15	Aplecta Tincta	June 16
Spilosoma Lubricipeda	May 21	Metrocampa Margaritaria	,, 22
Hepialus Lupulinus	May 25	Himera Pennaria	Oct. 10
Zeuzera Aesculi	June 13	Amphydasis Prodromaria	Mar. 29
Dasychira Pudibunda	April 15	Boarmia Rhomboidaria	June 26
Bombyx Quercus	June 19	,, Roboraria	June 22
Platypteryx Lacertula	May 25	Phorodesma Bajularia	July 4
,, Falcula	May 18	Ephyra Punctaria	June 7
Lophopteryx Camelina	May 6	,, Pendularia	May 25
Diloba Caeruleocephala	Oct. 6	Asthena Candidata	June 7
Leucania Lithargyria	June 29	Acidalia Imitaria	July 6
,, Comma	June 5	Cabera Pusaria	May 25
Xylophasia Rurea	June 2	,, Exanthemaria	May 25
Luperina Testacea	Sept. 23	Bupalus Piniaria	May 11
Caradrina Blanda	June 25	Larentia Pectinitaria	June 12
,, Cubicularis	June 9	Melanthia Rubiginata	June 4
Agrotis Porphyrea	June 5	,, Ocellata	May 26
Noctua Augur	July 6	Melanippe Montanata	May 25
,, Brunnea	July	Phibalapteryx Tersata	May 14
Mania Typica	July 1	Cidaria Miata	Sept. 23
Anchocelis Pistacina	Oct. 5		

The following moths caught in 1889 are new to our lists.

Callimorpha Dominula	June	Hadena Genistae	June 1
Bryophila Perla	June 14	Brephos Parthenias	April 8
Acronycta Leporina	June	Tephrosia Biundularia	May 24
Cerigo Cytherea	July 22	Coremia Unidentata	April 27
Hadena Proteus	Sept. 23	Pelurga Comitata	July
,, Oleracea	July 7	Chesias Obliquaria	June

It will be noticed that several fairly common species are put down as "New Captures." They have probably been taken before, but no previous record of their capture has been made.

J. E. HALES,

Entomological Album Keeper.

ZOOLOGICAL REPORT.

There is very little to record during the past season under this head; several small flocks of Crossbills have been observed in the neighbourhood, which, owing to their late appearance in the spring, had probably nested in the district in February or March: last June a Redpoll's nest with five young ones was found near the lakes which is rather an uncommon occurrence. A Hawfinch has been frequently seen in Mr. Davenport's garden in previous years and one again appeared there two days before Christmas. As indicating the exceptional mildness of the season it was noted that the Missel-thrush was singing on Christmas Day.

Several large carp of over 4 lbs. each have been caught in the top lake during the Summer Term.

Several eggs have been replaced in the School collection, as a great many in the old collection, which seems to have been greatly neglected of late, have been broken. We hope somebody will shortly take in hand the task of arranging this collection, and we shall be very grateful for any additions to help to replenish our now almost empty drawers.

Mr. Horace W. Monckton, F.G.S. has been kind enough to point out an error in the list of land and freshwater shells printed on p. 52 of our Report for 1888.

Planorbis spirorbis	Basingstoke Canal
should have been	
Planorbis vortex	Blackwater River.

R. SPARROW,

ZOOLOGICAL ALBUM KEEPER.

ETHNOLOGICAL REPORT.

Miscellaneous.

We have received a handsome piece of wood-carving from an old monastery at Salenmyo, Upper Burmah, brought over by Major W. C. Black, O.W. This is now exhibited in the Lane Reading Room.

H. W. O. Hagreen, Esq. has presented a child's rattle, a horse's frontlet, and some rope reins from Jeypore, India.

Archæological.

Horace Monckton, Esq., O.W., has given us an upper mill-stone, nearly perfect, though in three pieces. It was dug up at Wickham Bushes along with other Roman objects, and is supposed to be of the same date.

Numismatics.

H. Scott Boys, Esq., besides presenting the six first Indian coins in the following list, has very kindly furnished the annexed particulars with regard to such other Indian coins as were already in the College collection.

No. 1.—This coin is one of the punch-marked coins, the most ancient found in India. They belong to a period when die-sinking or moulding was unknown, and certainly date earlier than 600 B.C.

The devices on them are of various kinds, but there is a general character running through the class. The rose and wheel (*chakra*) is a very common sign found upon them.

On this coin there is the rose and the fore part of a sacred bull. These coins certainly belong to the Hindu dynasties.

No 2.—A coin of Oëmo Kadphises, the great Scythian conqueror of Upper India. His coins are still found in considerable numbers throughout the Punjab and the north west of India, thus indicating without doubt the extent of his empire. This king is the first of his dynasty, whom we find assuming the title of "King of Kings," the debased Greek inscription on the obverse in clear specimens being

ΒΑΣΙΛΕΥC ΒΑΣΙΛΕΩΝ, ΣΩΤΗΡ, ΜΕΓΑΣ 'ΟΗΜΩ ΚΑΔΦΙΣΗΣ.

The influence of the Hindu religion is clearly seen, the reverse having the sacred bull and Siva standing by it. On the coins of Eos Kadphises and Zathos Kadaphes, the two predecessors of Oemo Kadphises, and the first apparently of this dynasty, there are no such Hindu devices, and it is almost certain that Oemo Kadphises was the first Scythian who pushed forward from Bactria and Asia into India proper. His date is about 5 B.C., and he is the first of the series of Indo Scythic sovereigns. The Bactrian kingdom under Hermaeus Soter had been overthrown by the Scythian Azes about 130 B.C.

The reverse of the coin has an Aryan inscription, which is variously read. The obverse has the Greek inscription with the king sacrificing.

No 3.—A coin of Kanerkes (or Oerkos or Oerki), date about 50 A.D.; but, if the Ario-Parthian dynasty interrupted the Indo-Scythian (which is not likely), this king must be put 50 years later.

His coins differ from those of Kadphises in being none of them bilingual. The legends are all in very bad and corrupt Greek. Kanerkes appears to have reverted from the policy of conciliation pursued by Kadphises, and we find the Hindu bull only on his earlier coins. He soon abandoned all Hindu symbols and devices, and the later reverses all shew Mithraic figures with the aureole round the head. His rule, as that of Kadphises, comprised the whole of the North West of India and the Kabul valley.

No. 4—Coin of Kanerkes, differing from No. 3 in type.

The inscriptions in clear specimens are

On the reverse *ΑΘΡΟ.*

On the obverse

ΡΑΟ ΝΑΝΟ ΡΑΟ ΚΑΝΗΡΚΙ ΚΟΡΑΝΟ.

No 5.—Coin of Kanerkes. On the observe is the King standing by the altar, and holding in the left hand a spear. The inscription, which is partly legible is *PAO KA(NHPKI)*.

On the reverse is the Wind-god running; he holds in both hands his garment, which floats about him. Inscription *OAΔO*.

No 6.—This coin is one of the well-known series called the "Cock and the Bull." They may be of any date from B.C. 600 to A.D. 60, in fact may belong to any Buddhist period. On the obverse is a Bull, on the reverse a Cock standing under a palm-tree.

No 7 AND 8.—Sassanian Coins, date about 250 A.D. The Arsacidae, starting with Arsaces I, Governor of Parthia, who revolted from Antiochus Theus, reigned in Parthia from B.C. 254 to A.D. 235, numbering 27 kings. The last king, Arsaces Artabanus, was killed by Ardeshir Babakar, one of his generals, who founded the Sassanian dynasty in 235 A.D.

Obverse.—Head of king to the right, with tiara and hair in curled clusters at the back of the head. Legend in Pehlevi characters is illegible. These characters are descendants of the Phoenician and ancestors of the modern Persian alphabet.

Reverse.—The fire altar with supporting guards, one on each side. Flames and smoke are ascending from the altar.

No 9.—One of the coins of the Kananj sovereigns, who ruled in North West India just prior to the Mahommedan conquest of India. The legend in Devanagari characters is

SRI MAD GOVINDA CHANDRA DEVA.

On the obverse is a front figure of the goddess Lakshmi. The date of Govinda Chandra is 1120 A.D. The Rahtors (or Rajahs) of Kananj succumbed to Mahammad Ghori, the great Mussulman invader of India, in 1194 A.D.

The coin is of gold, much alloyed with silver. Its intrinsic value is about 10/-, and its numismatic value considerably more, but these coins are not uncommon.

No 10.—Copper coin of Mahammad Ghori, called also Mahammad bin Sam, who invaded India, and overthrew the Hindu rulers in 1192 A.D. at the decisive battle of Thaneswar, thus establishing the dynasties of the Parthian kings of Delhi, who, numbering forty sovereigns, reigned for more than three centuries and a half, 1152—1554.

Reverse.—The figure of a bull with trappings, greatly distorted; legend MAHAMMAD SAMI.

Obverse.—The figure of a horseman greatly distorted; legend SRI HAMMIRAH=" The Lord."

[The bull and horseman were the devices of the Choukar (Hindu) kings of Rajputana before the Mahommedan conquest. The conquerors adopt them but put new legends.]

No 11.—Silver coin of Mahammad Ghori, (see No 10).

Obverse.—AL SULTAN, AL AZIM, ABU ALMOZAFFAR, MAHAMMAD BIN SAM=The Sultan, the Great, the Unconquerable, Mahammad bin Sam.

Reverse. — The Mussulman "Kulma," ALLAH ILLAH ILLAHU, MAHAMMAD RASUL ILLAH="God is God, and Mahammad is the prophet of God."

No 12.—Copper coin of Mahammad Bin Sam, (like Nos. 10 and 11).

Obverse.—As No 11.

Reverse.—The Bull with KARMAN, the name of the mint, printed on its side.

Nos. 13—17.—Five silver coins (modern) of one of the Rajput states, probably Jodhpur.

Nos. 18—20.—Modern Rajput coins.

PHOTOGRAPHIC SECTION.

BALANCE SHEET, 1889.

RECEIPTS.

	£	s.	d.
Midsummer Term.			
To 15 Members' Entrance Fees ...	3	15	0
,, Terminal Subscriptions		15	0
To N.S.S. for returned subscriptions of 15 Associates		15	0
Michaelmas Term.			
To 3 Members' Entrance Fees ...		15	0
,, 11 Members' Terminal Subscriptions		11	0
,, N.S.S. for returned subscriptions for 11 Members		11	0
,, Grant from The Master	5	0	0
,, Grant from the N.S.S.	7	0	0
	19	2	0

EXPENDITURE.

	£	s.	d.
Midsummer Term.			
By Account Book		1	0
Bursar for fitting up Dark Room ...	12	0	6
Heelas (Curtains, &c.)	1	3	6½
Spray Tap		12	6
Gas Optimus Lamp		13	0
Ruby Glass and Screen		6	6
3 Dishes		5	6
Glass Measures		3	6
Ruby Medium 3 yds....		5	0
,, ,, 3 yds....		5	1
Carriage of Parcels		5	6
Cleaning Dark Room—Mids. Term		2	6
Cleaning Dark Room—Mich. Term		2	6
Hyposulphite of Soda (Satchell) ...		6	3
Jar for the same		2	6
Balance in hand	2	6	7½
	19	2	0

Signed { P. L. FOSTER.
R. H. TAHOURDIN.

PHOTOGRAPHIC SECTION.

In response to applications which gave evidence that Photography would be practised, if the means were supplied, two meetings of the N.S.S. was held on February 26th and March 2nd; The President took the chair, and a Photographic Section of the Society was constituted, of which the Rev. P. H. Kempthorne was appointed Director, and P. L. Foster Secretary and Treasurer.

Considerable delay ensued, before further proceedings could be taken, because unexpected obstacles arose to the possession of the dark room which had been promised to the Society. With the kind assistance of the Master and the Bursar another chamber was at length discovered, which turned out to be suitable for photographic purposes.

By the beginning of April the considerable alterations required to adapt the dark room for development were carried out, and on April 13th, the first meeting of the Photographic Section was held in Mr. Saunder's Class room, the Director in the Chair.

The following Rules were then passed:

(1) Proposed by C. L. Hulbert, seconded by R. H. Tahourdin.

"That any Member or Associate of the N.S.S. may become a member of the Photographic Section upon payment of the Entrance Fee and subscription for the term."

(2) Proposed by R. H. Tahourdin, seconded by C. Walter.

"That, in addition to their subscription to the N.S.S., the members of the Photographic Section shall pay an entrance fee of 5s., and a terminal subscription of 1s. for the use of the Dark Room."

(3) Proposed by C. Walter, seconded by H. F. Blair.

"That any Member of the Photographic Section may have a key of the Dark Room on paying a deposit of 2s., which will be forfeited, if the key is lost."

(4) The following Bye Laws were also carried

"A fine of 6d. shall be imposed, if a tap is left running in the absence of the Operator."

"On leaving the Dark Room, the Door must be locked and the Gas turned out."

"Damage to the fittings or apparatus of the Dark Room, if due to neglect or carelessness, must be paid for by the member who had the use of it at the time."

It was resolved at a subsequent meeting

"That no member of the School who is not a member of the Photographic Section be admitted to the use of the Dark Room."

The original members of the Section were as follows:

P. L. Foster (Secretary and Treasurer).
R. H. Tahourdin
C. L. Hulbert
G. Whitfield
C. Walter
J. C. L. Bott
W. R. W. Shand
H. A. H. Ramsay
W. P. Lynes
J. L. Ingham
H. F. Blair
R. L. McClintock
E. C. Ward
O. C. Raphael
J. R. de M. Abbott

It will be observed from the Balance Sheet that the funds for the expensive fitting required were found from three sources; 1st, a grant of £5 by the Master from the Fines fund, 2nd, a grant of £7 from the Natural Science Society, 3rd, from the Entrance Fees of the members of the Section. A Balance of £2 6s. 7½d. remains. The accommodation provided has been found sufficient, but any large increase of the members will involve the addition of another developing sink and table at considerable cost.

On June 25th, an excursion was made to Guildford. Very few members availed themselves of this opportunity, but the scenery of the Wey proved attractive and some excellent work was done. The fire which took place in the Director's house prevented further efforts of this kind. There was a small but creditable exhibition of photographs by members exhibited in the Library on Speech Day. The Dark Room was in constant use during the last weeks of the Term. G. Whitfield was elected secretary *pro tem.* in the absence of P. L. Foster, who, upon his entrance into Woolwich, resigned his office.

At the beginning of the Michaelmas Term, R. H. Tahourdin was appointed to the office of Secretary and Treasurer.

The new members were :

C. C. Hamilton
A. S. Waley
J. H. Lloyd

The Michaelmas term is always unfavourable to the Photographer, and on the whole the light has been during the afternoon exceptionally bad. Little work has been done with the Camera. There have been two lectures of which an account has been given elsewhere. We must, however, here record our thanks to Mr. Elder for his valuable aid, and for his interesting discourse on Platinotype Printing, which will, it is hoped, be practised by many of our members in the year to come.

In conclusion we have to thank the Director for the time and trouble he has devoted to the formation and management of the section.

R. H. TAHOURDIN,

SECRETARY OF THE PHOTOGRAPHIC SECTION.